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SOUTH PACIFIC COMMISSION

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UNESCO Study Kit
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PUBLISHED BY THE SOUTH PACIFIC COMMISSION, NOUMEA, NEW CALEDONIA

THE SOUTH PACIFIC COMMISSION

The South Pacific Commission is an advisory and consultative body set up by the six Governments responsible for the administration of Island Territories in the South Pacific region. Its purpose is to recommend to the member Governments means for promoting the well-being of the people of these territories. It is concerned with social, economic and health matters. Its headquarters are at Noumea, New Caledonia.

The Commission was established by an Agreement between the Governments of Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States of America, signed at Canberra on the 6th February, 1947, and finally ratified on the 29th July, 1948. Until the 7th November, 1951, the area of the Commission's activities comprised territories lying generally south of the equator from and including Netherlands New Guinea in the west to the French Establishments in Oceania and Pitcairn in the east. On 7th November, 1951, an additional Agreement was signed at Commission headquarters in Noumea on behalf of the six participating Governments, extending the scope of the Commission to include Guam and the Trust Territory of the Pacific Islands under United States administration.

The Commission consists of twelve Commissioners, two from each Government, and meets twice a year. The first Session was held in May, 1948. There are two auxiliary bodies, the Research Council and the South Pacific Conference.

The Research Council, which assembles once a year, held its first meeting in May, 1949. Members are appointed by the Commission, and are selected for their special knowledge of the questions with which the Commission is concerned, and the problems of the territories in these fields. The chief function of the Research Council is to advise the Commission what investigations are necessary. Arrangements to carry out those that are approved are the responsibility of the Secretary-General and other principal officers.

The South Pacific Conference, which meets at intervals not exceeding three years, consists of delegates from the local inhabitants of the territories, who may be accompanied by advisers. The first Conference was held in Suva in April, 1950, and was attended by delegates from fifteen territories and from the Kingdom of Tonga. The second Conference was held at Commission headquarters in April, 1953.

The Commission's staff includes six principal officers, as follows: Secretary-General, Sir Brian Freeston, K.C.M.G., O.B.E.; Deputy Chairman of the Research Council, Dr. E. M. Ojala; Deputy Secretary-General, Mr. John Ryan; Executive Officer for Health, Dr. E. Massal; Executive Officer for Economic Development, Dr. A. H. J. Kroon; Executive Officer for Social Development, Mr. H. E. Maude, O.B.E. The Deputy Chairman and the three Executive Officers are ex officio members of the Research Council. The principal officers are supported by a small technical and administrative staff.

Further particulars of the Commission's activities may be obtained from the Secretary-General, Noumea, New Caledonia.

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THE SPC QUARTERLY BULLETIN, first published in January, 1951, features articles on selected activities in the Commission's three main fields of operation: economic development, health and social development. Articles are also contributed by specialists working in these and related fields, in the territories within the Commission area.

THE BULLETIN is given selective world distribution to people and institutions in widely differing fields sharing a common interest in the purposes and work of the Commission. It is published in two editions, English and French.

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The purchase of this tractor and agricultural implements for the Nimboran project was made possible by a grant from the South Pacific Commission.

Community Development In The Nimboran

*Responsibility for planning and carrying out the second of two pilot community development schemes proposed by the Commission's Research Council at its first meeting in 1949 was accepted by the Government of Netherlands New Guinea, which chose the Nimboran as its site. This article is based on two official reports on the project.**

THE Nimboran consists of a plain crossed by the River Grimé and of the lower slopes of the Nimboran Hills which bound the area on the south. The plain as a whole is largely covered with forest, some of it secondary forest. Stretches of lalang grass are to be found, mostly close to the villages. Where the ground is marshy it is also overgrown with trees, and bears an abundant growth of wild sago.

The Nimboran lies approximately 45 miles W.S.W. of Hollandia, capital of the territory. There are 23 villages, the largest being Genjem, headquarters of the District Officer. In 1952 a registration of the population showed it to consist of 1,368 males and 1,401 females; a numerical proportion between boys and girls and between men and women that may be called normal, but which for New Guinea is exceptional. By Papuan standards, moreover, the Nimboran community is well integrated by marriage ties, and the population density of the district, which covers an area of approximately 40 sq. miles, is well above the average.

The old religious beliefs and the festivals connected with them have been given up, and the community is now Christian. Church services are well attended and there is a conscious acceptance of Christianity.

The community is divided into numerous local clans, a village being made up of from one to four of such groups, each living in its own cluster of houses. Once apparently each clan was more inclined to form its own separate village, but today the people live closer together and village life is, generally speaking, fairly well organized. However, the clan is still a most important unit, and the village may be defined as a combination of clans living together, each retaining its own independence, co-operating with each other. Each clan has its hereditary

* One report has been published by the Commission as Technical Paper No. 42. The other will shortly be issued in the same series.—Editor.

headman, but each village has a village chief who is appointed by the Government and is therefore the government representative. The village chief, unlike the clan headman, can be dismissed and replaced by authority of the District Officer.

The principal food of the population is sago, mostly cultivated in small flooded fields at the foot of the Nimboran Hills, although the wild sago is also harvested. This is supplemented with yams and cassava grown in small allotments. As the region abounds in game, hunting is another important means of subsistence. The very few oxen in the area are not used, either for drawing carts or for work in the fields. Only a small amount of time and labour has to be spent on the allotments and on the gathering and preparation of sago. The District Officer at Genjem estimates that a man and his family need only work in their allotment during 60 days in the year. If another 40 days are added for maintenance of the family dwelling and for hunting, there are still more than 250 days per year available for other activities. These often take the form of handcrafts such as basket-making and carpentry.

The people are industrious by Papuan standards, and for a district with a closed economy, restricted to this small area, Nimboran is a prosperous region, able to supply all the necessities of life.

Background of Development Project

The adoption of Christianity, and the impact of new ideas resulting from contact with the Japanese and, after them, the Americans, during and immediately following the war, have caused a disturbance of social life. Under the influence of the Mission, the bride-price, once paid in such articles as stone axes produced in the district, and antique glass beads, is now paid in money and modern goods. To obtain these the men must go to Hollandia in order to find wage employment and to buy the goods. This pressure to go to the city has gradually increased with the increase in the bride-price, which in recent years has risen to as much as the equivalent of £stg.80. There is also a new eagerness to be dressed properly, and to satisfy this it is again necessary to go to Hollandia. This tendency of the males to migrate forms the greatest danger for Nimboran society. It does, however, face another difficulty, namely, the usual acculturation problems of a people whose own world has collapsed and who as yet have no part in the outer world which they now recognize as real. Elements akin to manifestations of cargo-cult have been observed.

The target of the development plan drafted in 1951 is therefore a society that will be able to enter into communication with the modern world without further aid from outside and without damage to itself; a society that will feel at home in this situation and that will react rationally to the inevitable demands of the time.

The means of achieving this must first be found in the economic sphere. In order to arrest the exodus from the district, and thus prevent the social disintegration of the community, an opportunity must be given to the people to earn money and to acquire modern goods within the district itself. The basic requirement for this is the introduction, under expert guidance, of new economic procedures. The scheme drawn up therefore envisaged a development project supervised at first by the District Officer at Genjem and his specialized staff working in direct touch with the various community activities being encouraged. These fall into two categories—those dealing with economic development and those with social development.

Economic Development

The soil of the Nimboran, being fertile and flat with almost no surface stone, offers good prospects for mechanical cultivation. A piece of land for a mechanized farm of 100 acres was selected at Sarmi Kerang, about one mile N.E. of Genjem and within three miles of all but one of the villages in the Nimboran area. This farm will be the means of introducing modern agricultural methods to the people, and its exploitation should provide a valuable source of income to the community.

The need for a store in the district had already been felt before the development plan was undertaken. Opened in 1950 mainly for the sale of tools, it was established with the help of the Government Agricultural Information Service and the Mission. Under the development project it was planned to take over the store and to increase the variety of goods offered for sale, not only by importations from Hollandia, but by purchases of suitable articles produced by the local small industries.

A valuable contribution to the development of the Nimboran could be expected from the introduction of small industries and home-industries in the district. To encourage the setting up of such undertakings and to ensure their continued operation it was decided to create a buying agency on the spot which, by purchasing the output of these industries, would enable their operators to convert the fruits of their labour into cash.

The success of the above undertakings must be largely dependent on the ability to transport the produce of the farm and the bulk of the production of the local industries to their market in Hollandia, and to bring back from there the goods to be sold at the store and tools and other supplies for the farm.

Access to the Nimboran area from Hollandia is by road to the Sentani Lake, thence by ferry to Borowai, from which a 24 mile long jeep road leads to Nimboran. The condition of this road could be a limiting factor in the economic development of the Nimboran, and although much money had been spent on its improvement and maintenance since the war, it was clear a great deal more will have to be spent on it before it can be called satisfactory.

Social Development

Nimboran is fortunate enough to have had established in 1951, initially under the missionary's wife, a continuation school for girls, in which the teaching is to be the equivalent of the fifth, sixth and seventh years of primary schools. In the top class infant welfare and infant hygiene will be taught, and in this an opportunity for practical child-care will be offered when the plans of the Netherlands New Guinea Government to erect a simple hospital and to station a European maternity nurse in the district have been realized.

The school serves not only Nimboran, but also a large part of the rest of Netherlands New Guinea. Its significance naturally lies in the example afforded by the better-educated girl who, returning to her village full of new ideas, is apt more than anyone else to contribute to a change in the way of life.

An out-patients' clinic run by the district male nurse provided for the medical needs of the district. The Government has now made plans not only to set up a simple hospital, but also for a mobile medical team to visit the area. This team, consisting of a doctor and several assistants, is primarily intended to combat framboesia (yaws).

The main problem in social development work, however, lies in the stimulation of the community's own social life and in the encouragement of a certain amount of entertainment for the sake of the focus of interest that it can bring about. Association football is nowadays the only recreation engaged in, and of the old customs in the way of entertainment hardly anything remains. The population, however, looks upon church services as a form of entertainment. Of course, Christmas and the New Year are of great significance, and these with Queen Juliana's Birthday are occasions of great rejoicing and are important events in an otherwise monotonous everyday life. An accepted custom at Christmas has been the performance of a simple one-act play based on a Bible story, and this suggested the possibility of performing short plays of a non-religious nature. These performances, it was thought, might be combined with choir and community singing, disassociated from religious matters which have up till now formed the sole theme of such entertainments. As a beginning it

To permit a tractor and implements to be driven to their district in order to carry out the agricultural development programme, the people of the Nimboran turned out in force to build eight miles of corduroy road through the jungle (left).

Opposite: A suspension bridge strong enough for the tractor to cross was built of steel cable and rattan above the existing Oranje Bridge, on the road to Nimboran.

The enthusiasm of the volunteers, who numbered over four hundred, was such that they completed both road and bridge in five days.

was decided to translate into Malay a number of suitable songs of the campfire variety and put them into a form acceptable to the Nimboran people.

Although the whole project would at first need the close personal supervision of the District Officer, it was envisaged that the economic activities would in due course be brought under the control of a co-operative society, membership of which would be open only to the Nimboran community. The society would of course also co-operate in the social development plans. In view, however, of the lack of experience of the local inhabitants, the District Officer's supervision and guidance would be required for some considerable time to come.

Development Plan Put Into Operation

A supervisory council of the Nimboran development project was created by decree of the Government of Netherlands New Guinea in July, 1952, the District Officer at Genjem being appointed the executive authority of the project. A start had already been made at the beginning of 1952, when the store was taken over and the stimulation of such small industries as already existed was put in hand. Rumours of the plans for the economic development of the district aroused the interest and enthusiasm of the population and soon the District Officer, who acted as adviser to the local industries, was inundated with requests for advice and information from people who wished to participate in the movement.

A temporary agency was set up at that early stage of the project, to run the store and to purchase the products of the local industries. This agency was given the name — "Buying and Selling Centre of the Nimboran Co-operative Community" — and was under the general supervision of the District Officer. The management and daily superintendence was entrusted to a Nimboran clerk of the Civil Service, who, when the scheme began to get into its stride, asked for and was given the assistance of a number of local volunteer helpers. The clerk proved himself both capable and diligent and his helpers, who assisted him in the buying up of the products of the local industries and in running the store, showed a remarkable aptitude for the work they had undertaken.

The industries to be developed were of two types, namely, home industries and small industries. The former were carried out by individuals in their own homes; they were grouped by villages and were looked after by the village schoolmaster or some other leading villager who allocated among those taking part the orders for the various articles, their collection when ready, their sale to the Buying Centre, and finally the payment to each individual for the goods he or she had produced. These home-industries produced bamboo and rattan basketwork, fine rattan basketwork, and pottery.

The small industries were each set up by one or more persons skilled in some particular trade. This person or persons constituted the management and engaged others who, irrespective of the villages from which they came, felt attracted to that particular trade. These small industries differ from the home industries in that the work is done collectively in a fixed place on the principle of a division of labour. Remuneration of those taking part is either by the equal division of the money earned or by the payment of a daily wage.

In the timber industry (pit-sawing) those taking part were divided into six teams, each of four to six fellow-villagers, working independently but all operating in the same area of forest. The manager indicates what type of sawn timber is required, sees to its collection and storage in the undertaking's shed and negotiates its sale to the Buying Centre. Each team is paid according to its production, members arranging among themselves how the earnings are to be apportioned.

Besides sawn timber, the small industries produce mats, furniture, charcoal and sago-cakes. As the scheme progressed and increasing quantities of goods were being offered for sale, the Buying Centre was also invited to purchase the surplus products of the subsistence farming of the villagers. As a result of this development the people began to extend their allotments in order to grow ground-nuts, beans and maize as cash crops. Although the Buying Centre only commenced its operations in March, 1952, by the end of the year it had purchased about £stg.520 worth of goods from the small industries, about £85 worth from the home industries and about £50 worth from the farmers.

The lack of funds made it impossible in the beginning to stock the store with much more than the tools supplied on credit by the Government Agricultural Information Service, and the turnover was therefore small. In July the Government lent this store a sum slightly greater than the loan from the Mission, so that the latter could be repaid. In November more funds were made available by the Government, and so in December, for the first time, it was possible to offer for sale in the store a really good supply and variety of articles.

The quantity and diversity of its stock in trade was the factor which mostly influenced the store's turnover, which by the end of the year amounted to the equivalent of £stg.1,050. On this turnover, the store made a profit of £170. It should be noted that the assistants in the store received no salary, but a sum equal to 4 per cent. of the turnover was reserved for distribution among them, and this item has been taken into account in calculating the profit.

The Mechanized Farm

Compared with the activities of the Buying and Selling Centre, the clearing and preparation of the ground for the farm project by mechanical means was something entirely new to the Nimboran people. Their contact with the Western world, with the Japanese and the Americans, had created the myth of the machine—a contrivance which they be-

lieved to be capable of making all manner of goods with little or no human aid. Their faith in machines is unlimited, so that they were immensely excited at the news that a tractor was to be stationed in their district.

The purchase of a Fordson Major tractor with attachments and implements for use on the farm was largely made possible by a grant of £stg.1,100 from the South Pacific Commission. The arrival of this tractor from Hollandia early in September, 1952, is described by the District Officer of Nimboran in the article, "A Tractor Goes to Sarmi Kerang" in the *Quarterly Bulletin* for October, 1952. The last eight miles of the road from Borowai had at the time not been completed, but when an appeal was made for volunteers to make it passable for the tractor, more than 400 men turned up. As well as the road, a temporary suspension bridge over the Grimé River had to be built, as the existing bridge was not suitable for the tractor. Such was the enthusiasm of the population that both the road and the bridge were completed in five days, and the tractor arrived safely at the farm site on 9th September.

Within a few days of its arrival, the tractor commenced the work of clearing the ground. Under the supervision of the District Officer, a staff composed entirely of Nimboran inhabitants worked with such zeal that some 37 acres on the farm were prepared for sowing in a comparatively short time. By the end of the third week in November the prepared ground had been sown with maize.

The permanent staff of the farm consisted of a manager, two foremen, two tractor drivers, one fitter and his assistant, all Papuans. The drivers and fitter had apparently been well trained in Hollandia: in December, 1953, a South Pacific Commission officer visiting the farm reported that the tractor and its attachments had given trouble-free service and seemed, after a full year's use, to be still in very good condition.

The farm also employed casual labour, both male and female, drawn from the district. This labour force was at first fairly large to cope with the initial work to be done. Their work, however, was of a non-recurrent nature and consisted of the removal of the original vegetation cleared by the tractor, the putting down of drains and the building of a shed from local raw materials to house the farm equipment, and eventually to store the harvested crop.

Although the average rainfall figures for the district had been consulted to decide the most favourable planting time and type of crop to be planted, an abnormal amount of rain fell soon after the seed was in the ground. This flooded parts of the sown acreage for some days, for the drains which had been constructed proved unable to deal with the heavy fall of rain. It also appeared that the ground was less porous than had been expected. About one third of the crop was lost through this flooding, so that it seemed probable that the farm's first harvest would result in a financial loss.

The crop rotation for last year was groundnuts, soy bean or green gram (chick-pea) during the "dry" season (May - June), followed by a green crop and, in December, rice.

The Commission Officer who saw the farm in December reported that a very profitable crop of groundnuts had been harvested earlier in the year. At the time of his visit, a healthy rice crop was standing two feet high on about half the cleared area, and the other half was being prepared for planting. He also reported that in July the responsibility for the agricultural aspects of the project was placed with the Division of Agriculture and Stock of the Netherlands New Guinea Government, partly because it was felt that in order to get the best results from the farm some further agronomic research should be carried out by the Research Section of the Division. Such research would embrace the finding of a balanced crop rotation, the control of pests and diseases and the proper drainage of the land. This last problem has proved difficult; the surface layer is of fine black silt loam overlying sand, but surprisingly both lateral and vertical movement of water in the soil seems to be impeded. Bamboo drains have been tried successfully, but dismissed as too arduous a practice, and some other solution is being sought.

The problems of production costs and marketing which have arisen will also claim the attention of the Research Section.

The Co-operative Society

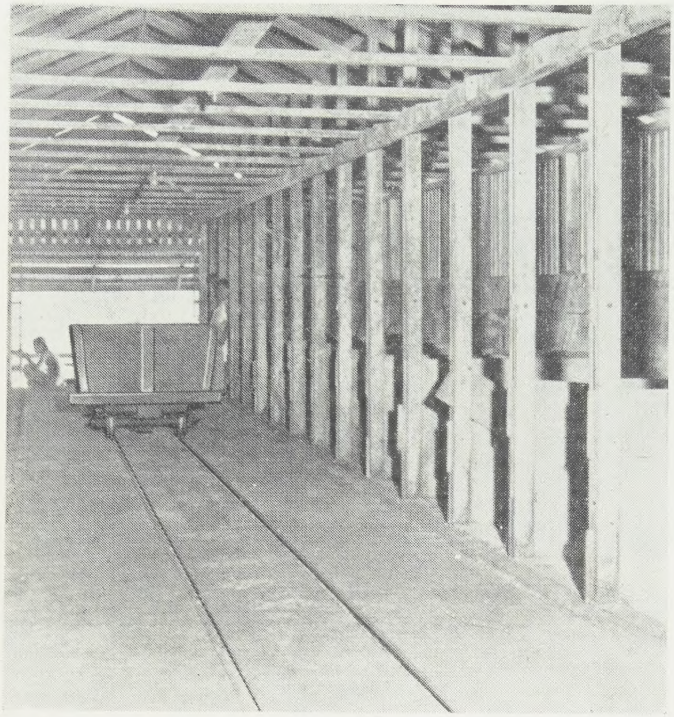
The Co-operative Society came into being in the last days of 1952, and took over the direct running of the store, the farm, and the agency for the purchase and re-sale of the products of the local small industries. The name given to it was "Jawa Datum Co-operative Society", and this is what the visiting Commission officer says about it, nearly a year after it was established:

> "The Society has 800 members and the entry fee is 7.50 guilders, or 10 guilders (£1) for man and wife. In addition, investment shares at 5 guilders are printed and are bought and sold by the people as their demand for cash fluctuates. In September, 1953, the Society's capital was approximately 30,000 guilders, against which it had liabilities (to the Government) of only about 7,000 guilders. It commenced operations in January, 1953, and the total turnover in its first 11 months amounted to 123,000 guilders (£stg.11,300)."

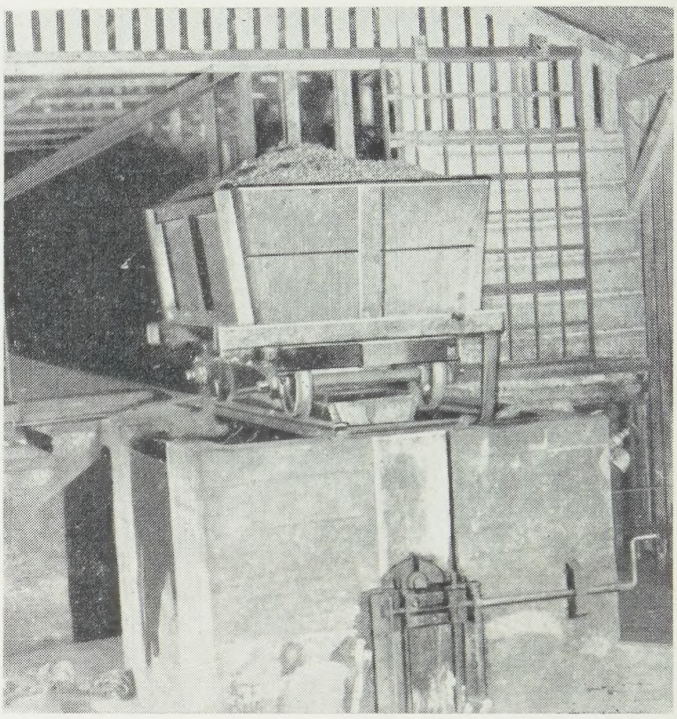
The Society promotes the local industries by providing finance from its investment funds, which are separate from its trading funds. These investment funds are built up by the 5 guilder shares mentioned above. The Society's affairs are run by a board elected by the members and the Society's accounting, which seemed to the Commission officer to be very adequate, is attended to entirely by Papuans under the training and direction of the District Officer.

Recent Social Development

The emphasis of the Nimboran Community Development Project has been strongly on economic activities to date, since the economic development of the area was seen to be basic to other aspects of progress and social cohesion; and the manner of the people's participation in the economic activities is, of course, a significant part of the general community development. (*Continued on page 30*)



Twenty wooden boxes line each side of the Reparation Estates' fermentaries.



After five and a half days in the fermenting boxes, the cocoa beans pass through the washing drum.

Processing Cocoa Beans In Western Samoa

By D. R. A. EDEN

General Manager, New Zealand Reparation Estates, Western Samoa

New methods used in Western Samoa in the processing of cocoa beans are described in this paper, which was presented by Mr. Eden at the Cocoa Conference held in London last September.[1]

AN unusual feature in the processing of cocoa beans in Western Samoa is an interrupted kiln drying and the subsequent promotion of oxidation by the use of rotating drying drums. This system of reconditioning was evolved for the improvement of native sun-dried cocoa, where the initial process of fermentation had not been successfully concluded.

Some ten years ago a buyer of native cocoa beans sought our assistance in improving a quantity of mouldy, under-fermented and under-dried cocoa which had been rejected by the Government inspector for export. This parcel was delivered to our Tuanaimato factory, where it was washed and subsequently re-dried in one of our rotary driers. The result was surprising, the quality and appearance of the dull, under-fermented cocoa beans being improved to such a degree that we believed some new principle in processing had been discovered. I found, however, that Dr. A. Schulte im Hofe, writing in 1908[2], had described a similar process which he advocated for the improvement of flavour and the elimination of acid aroma in cocoa beans.

Proceeding on the theory that cocoa fermentation may be divided into two sections or stages, an alcoholic and acetic acid fermentation and a subsequent oxidation, im Hofe maintained that fermentation should be interrupted at a stage when the acetic acid had penetrated sufficiently into the cotyledons. "Otherwise," he stated, "super-acidification would supervene to produce an acrid, bitter flavour and taste in the finished product."

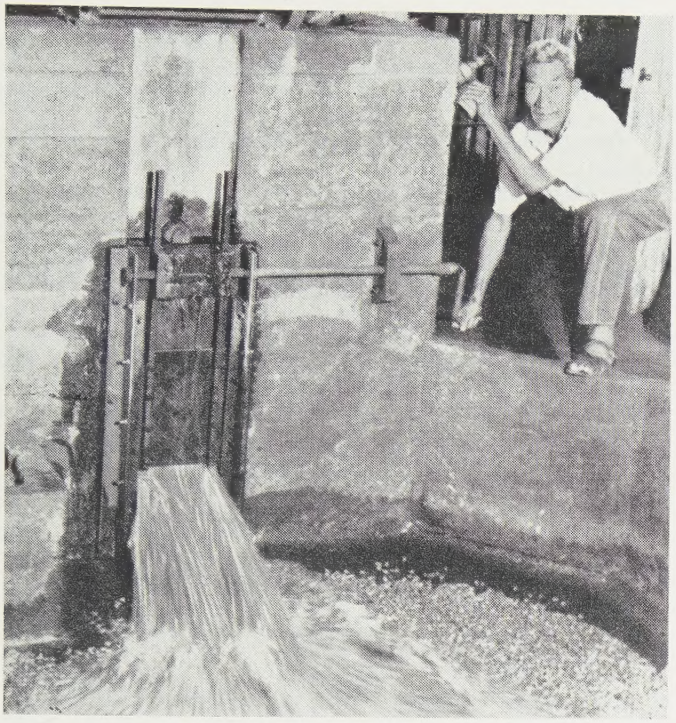
Im Hofe demonstrated the second process of oxidation experimentally by drying cocoa beans fermented for only two or three days to a stage when they still contained approximately 15 per cent. of moisture. He then returned the partly-fermented and partly-dried cocoa beans to fermenting boxes artificially heated by steam coils to between 40° and 45° C. The beans were retained in the boxes until, as he expressed it, "the best degree of oxidation had been obtained." Apparently taste alone determined the latter factor.

His methods apparently found little favour in his day, being either too involved or too bothersome to interest planters. Contemporary experts, however, conceded that the methods did improve the flavour of cocoa beans.

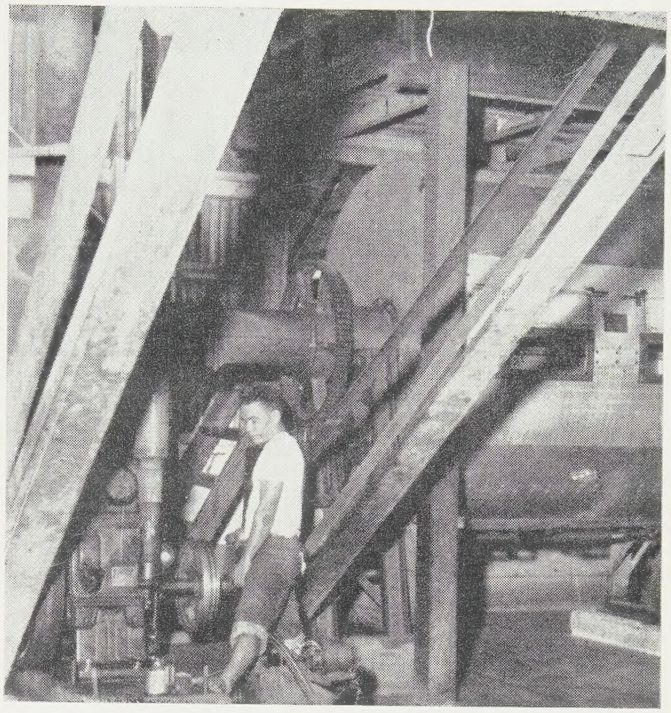
Our reconditioning of the under-fermented and under-dried native cocoa followed the lines of im Hofe's experiment by concluding, after a somewhat sustained interruption, the oxidation of the cocoa beans. The only difference between his method and ours was that we accomplished the process in a rotating drum with a hot air draught instead of

1 The Conference was organized by the Cocoa, Chocolate and Confectionery Alliance Ltd. in association with the Office International du Cacao et du Chocolat.

2 Dr. A. Schulte im Hofe in **The Fermentation of Cocoa**, by H. Hamel Smith. John Bale, Sons, and Danielsson, Ltd.



The washed cocoa beans are discharged through a gate at the bottom of the tank, to a cement draining pit.



The McKinnon drying and re-conditioning drum consists of a perforated rustless metal cylinder, mechanically revolving on wide, hollow bearings.

in a stationary fermenting box heated by steam pipes.

It was but a small step of reasoning, after reviewing the excellent results obtained by our reconditioning of the parcel of native cocoa beans, to suppose that our own product, however well fermented, might also be improved by the application of similar principles. It was possible, too, we believed, that whenever an abnormal ferment was encountered, subsequent oxidation might go a long way towards correcting deficiencies which had originated in the fermentary. This indeed proved to be the case, and after a number of successful experiments, the system of rotary drum reconditioning or oxidation became standard practice on our cocoa estates.

The advantages of reconditioning were so obvious to buyers of native cocoa, and our own standard of quality was so regularly maintained, that oxidation through the use of rotary drums has been adopted throughout the territory of Western Samoa. Today all native cocoa is carefully processed before shipment, and rotary reconditioning plants are a feature of the Apia cocoa sheds where the principal buying organizations handle their cocoa beans for export.

Planters and buyers of native cocoa beans in other countries may be interested in the mechanics of our processing. We ferment cocoa beans for five and a half days. We find that under Samoan conditions this period produces, in the dried product, cinnamon or light chocolate-coloured beans, a good aroma, and an even break, all of which we regard as signs of high quality.

There is no doubt that good fermentation is the base upon which successful processing is built, and attention to the correct mechanics of this initial phase cannot be over-emphasized.

Purpose of Fermentation

The purpose of fermentation should not be lost sight of. It is to:—

(1) Convert the tannic substances by oxidation to eliminate bitterness and develop flavour and colour;
(2) contract the mucilaginous mass surrounding the beans in order to assist in its removal by washing;
(3) loosen the connection between the cotyledons and their testa or envelope.

A moderate amount of fermentation will suffice to accomplish items (2) and (3), but colour and aroma, and consequently flavour, are fully developed only when the fermenting process is properly concluded.

Experience dictates that overheating in the fermentary building is to be deprecated. Overheated chambers tend to promote conditions which harbour harmful bacteria, and a well-ventilated chamber at a temperature not exceeding 84°F. appears to be the ideal for Samoan conditions.

To achieve this we use bright aluminium sheeting on the roof to reflect sun heat, and construct the walls above the fermenting boxes of wooden slats with two-inch spacings to allow any heated air to escape. The sliding doors are iron grilles which take up little space, and provide further facilities for the free circulation of air within the building.

Twenty wooden boxes line both sides of our fermentaries. Their dimensions are five feet by four feet with a height of three feet. The boxes are constructed of 12-inch planks which fit into slots and are removable. The height of the boxes may thus be varied as desired. At the height of three feet, each holds approximately 3,000 lb. of wet cocoa. The exclusion of nail heads is desirable, because oxidation of the iron in contact with cocoa acids produces black patches on the beans, which mar the appearance of the final product.

After the first twelve hours, the cocoa in each box is turned daily. The pod cores of placentas and black inferior beans are searched for and extracted, as the mass is shovelled into an adjoining box. As soon as the new box is filled, a cover of banana leaves and heavy sacking is replaced, and the fermenting process is resumed.

The temperature of the fermenting mass and the exudate at the base of the fermenting boxes both indicate the state of the ferment. When the latter is white, frothy, sweet-smelling and volatile, the process is progressing favourably; when it is yellow, acid-smelling and sticky, it denotes the presence of unfavourable bacteria, and a degree of abnormality in the ferment has developed.

Abnormal ferments are fortunately uncommon, and vary greatly in intensity; they are sometimes the result of weeks

of continuous rain, when adverse weather conditions promote epidemics of black pod, *Phytopthora palmivora*. Occasionally, too, a ferment may be adversely affected when sacks of freshly opened cocoa beans have been left in the field, and have become saturated by rain storms. Pods picked carelessly, before they are fully ripe, may slow down the process. Sugar variations in the fruit pulp apparently contribute towards poor fermentations and may account for the presence of harmful bacteria. The results of poor fermentation are corrected by subsequent oxidation in the rotary driers.

After five and a half days in the fermenting boxes, the cocoa beans pass through the washing drum where three changes of water suffice to remove the contracted fruit pulp. When released, the cocoa beans are discharged through a gate in the bottom of the tank to a cement draining pit. The water runs off, and the drained beans are conveyed to an adjoining hot-air drier, where they are spread over a wooden grating which forms the drying platform; this holds 12,000 lb. of wet cocoa beans. Benzine flue pipes, leading from a brick furnace and lying some 8 feet below the drying platform, supply the heat, which rises through wooden slats to the beans on the platform.

The drier has an aluminium roof which may be drawn backwards or forwards by hand winch. When the roof is withdrawn, sun heat and artificial heat combine to provide rapid drying under ideal conditions. After twelve hours the hot-air drying is interrupted on the platform drier at a point when all surface moisture has been removed from the cocoa beans, but when a degree of dampness is still present in the cotyledons without free moisture being present. While there is a fairly wide margin for error, accuracy in judging the state at which the drying should be interrupted is gained by experience. Too high a percentage of moisture in the cotyledons should be avoided, because it will seep through the testa, and the wet skins may then develop moulds; over-drying is inadvisable, because brittle beans will break and form a high percentage of nibs in the general handling.

The partly dried beans are cooled to avoid sweating, and stored until a full loading for the three-ton rotary drum has been accumulated.

McKinnon Drying and Re-Conditioning Drum

The McKinnon drying and reconditioning drum consists of a perforated rustless metal cylinder, mechanically revolving on wide hollow bearings. A mechanically operated fan circulates air over a series of furnace-heated baffle plates, where it becomes heated, and passes through a hollow bearing to four equal-sized double-doored compartments in the revolving drum. The passage of the heated air dehydrates the cocoa beans as they are rotated within the compartments of the drum cylinder.

Just before loading into the rotary drier, the beans are lightly hosed with water until they have been evenly moistened. This re-application of surface moisture prevents case hardening of the testas, and ensures the removal of cotyledon-stored acids and odour through the skins during the subsequent drying.

The acid-laden hot air is so overpowering above a rotating drier that it is impossible to remain long on the loading platform, and the high factory roof must be constructed of aluminium or other acid-resisting roofing material to resist rapid corrosion by the escaping acids.[3]

The McKinnon drying or reconditioning drum is never used on our estates as a complete drier. It was, I understand, designed as a coffee drier. The small holes in the rustless metal of the drum surface become so clogged with the sticky residue on the surface of freshly washed beans that its use without some measure of pre-drying cannot be recommended. It is recommended, however, for adjusting quality variations, and as an oxidising agent its use cannot be overstated.

A three-ton McKinnon drum will hold forty sacks of pre-dried damped-down beans, or approximately 5,800 lb.

It is advisable to have the four compartments, into which the drum is divided, numbered for convenience. The following system of loading the compartments is recommended; it ensures an even distribution of weight:—

Compartment	No. 1.	Load with	7	sacks	full
„	„ 3.	„	„	10	„	„
„	„ 1.	„	„	3	„	„
„	„ 2.	„	„	7	„	„
„	„ 4.	„	„	10	„	„
„	„ 2.	„	„	3	„	„

The foregoing system will be found to prevent shuddering of the drum and excessive wear on the machine.

A fire should be stoked in the furnace at least half an hour before loading commences to ensure that the beans enter a completely warmed drum. The fan should be kept running when the fire is started, otherwise the baffle plates tend to burn out or crack.

The commencing temperature for a fully laden drum should be around 200°F. for the first six hours. At this temperature the drum exterior will be found to be too hot to handle comfortably.

After the first six hours, and as the cocoa dries, the temperature should be decreased by a gradual reduction in firing. The temperature graph should fall in a slow arc, from around 200° after six hours to room temperature. When the drying is completed the fire should be extinct, but both fan and drum revolutions should be continued until the cocoa has lost all heat.

Slow drying is the keynote of successful operation, and if dried too fast the bean parchment will become lustreless and brittle.

The drum is emptied by opening one side only of the double doors in each compartment as they revolve. After a full revolution has been completed, the other side of the doors are opened and the drum is revolved until all the compartments have been emptied.

Ten hours will generally complete the process in a McKinnon drum, assuming that pre-drying on the platform kiln occupied twelve hours and that the beans were not soaked too thoroughly during the dampening process.

When using this system for reconditioning native sun-dried cocoa beans, the same procedure is followed, except that, fermenting and pre-drying having been completed, reconditioning commences at the stage of dampening down. The same slow drying in the rotary drum follows the technique I have described.

[3] **Cocoa Plantation Management in Western Samoa**, by D. R. A. Eden and W. L. Edwards. South Pacific Commission Technical Paper No. 31.

Copra Cutting Machines

THERE were many interested spectators at a demonstration in Suva recently of machines for splitting coconuts and extracting the meat for copra-making. The machines were invented by Mr. Rey, of Tahiti, who supervised the demonstration.

The nuts are split by a knife which falls from a height, on the guillotine principle. The meat is then extracted by means of a curved vibrating blade. One of these blades is attached to the splitting machine, and a second portable machine is available, containing four blades.

The power in each case is provided by a small petrol motor which forms part of the machine. For both splitting and extracting, the operator remains seated.

Banana Storage Experiments

THREE small refrigerated chambers are being built at the Suva Wharf to enable experiments to be carried out in the storage of bananas before they are shipped to New Zealand. The chambers are being constructed by the Public Works Department and the refrigeration plant will be installed by Ellis, Hardie and Symington, of Wellington, who have offered to make the experiments for the Government of Fiji without charge. The experimental chambers will hold about 550 cases of bananas.

If it is found that bananas can be kept successfully in cool storage before being shipped it will be possible to bring the fruit to Suva at any time, instead of having to arrange cutting and transport to make sure that the bananas reach the vessel a short time before sailing. The present system limits the area from which the fruit can be drawn for shipment overseas.

These photographs were taken by Mr. Dumbleton, the Commission's plant and animal quarantine officer, during his recent visit to India. Top: Mr. T. V. Venkatraman, Commission entomologist, with beetles skewered on the wire spear used in India for extracting beetles from palm crowns. Centre: A beetle boy searching for and extracting beetles from the palm crown. Bottom: Central Coconut Research Station, Kasaragod, India.

Rhinoceros Beetle Control Campaign Is Under Way

By C. E. SAYERS*

The problem of controlling the Rhinoceros beetle (Oryctes rhinoceros) in South Pacific territories is now actively engaging the attention of two expert workers in the field — one entomologist in Western Samoa and another in southern India. This is the beginning of the first phase of the rhinoceros beetle research programme adopted by the South Pacific Commission in May, 1953, and announced in Noumea at the opening meeting of its eleventh session in the presence of the delegates who had been attending the Second South Pacific Conference.

THE menace to the coconut of this beetle—unwittingly introduced to the South Pacific many years ago from, it is believed, India or Ceylon—has been in the forefront of the Commission's quarantine and pests and diseases control considerations since its inception.

Mr. L. J. Dumbleton, the Commission's Plant and Animal Quarantine officer, was recommended after his appointment to give priority to the problem of control of this pest. Urgency was given to this recommendation by the appearance of the beetle at Vava'u, Tonga.

When, early in 1953, the beetle was found in Fiji the long-felt need for a co-ordinated programme of research with the ultimate object of eradication of the pest became increasingly apparent.

At the time the beetle was found in Fiji, Mr. Dumbleton was in Honolulu discussing proposals for co-ordinated work with entomologists of the Pacific Science Board.

The Second South Pacific Conference at its meeting in Nouméa a few weeks afterwards, discussed the problem and suggested area-wide action to control the beetle.

Appointment of Entomologists

The sympathy of the Commission was translated into action when it adopted proposals for the appointment of two entomologists to undertake a programme of research work under the three main headings:

1. A search in India, parts of South-East Asia, Africa and Madagascar for parasites, predators or diseases which might be of use in controlling the beetle in the Pacific.
2. An investigation in Western Samoa of the habits of the beetle, especially as affecting quarantine and control practice; also an investigation of chemical control and a search for attractants.
3. Investigation of the possibility of an attractant substance occurring in the palm.

Entomologists of the Pacific Science Board, and territorial entomologists to whom it was possible at short notice to submit the plan supported its general outline, and the Commission's Research

* Mr. Sayers is a well-known Australian journalist who has had extensive experience in Europe and South-East Asia. He gained first-hand knowledge of the South Pacific Commission and its activities when he attended the Second South Pacific Conference held in Noumea in April, 1953.

Council recommended adoption of the proposals without material modification.

These preliminaries having been completed, applicants for the two entomologists were invited throughout the world. From the applications received, Dr. R. A. Cumber, of New Zealand, was appointed to work in Western Samoa, and Mr. T. V. Venkatraman, of India, to work in India and other Asian areas.

Dr. Cumber, of the Entomology Division of the New Zealand Department of Scientific and Industrial Research, was trained in entomology at the Imperial College, London. He joined the New Zealand department after graduation, and made valuable contributions to the elucidation of yellow leaf disease in New Zealand flax.

The scope of Dr. Cumber's work in Western Samoa covers the wide field of the ecology and control of the beetle, in particular points affecting control measures and quarantine; for example, testing of attractants, flight range, attraction to light and the efficiency of existing methods of control. Dr. Cumber has been at work in Western Samoa since January 19, 1954.

Mr. Venkatraman, assistant insect epidemiologist, Division of Entomology, Indian Research Institute, has accepted appointment for three years, on loan from the Institute.

Trained in India, Mr. Venkatraman only recently completed a period of work and study in the Division of Entomology, C.S.I.R.O., Canberra, under the terms of a Colombo plan scholarship.

Mr. Venkatraman began his work on February 11, 1954, from headquarters at Trivandrum, the capital of Travancore-Cochin state in South India.

The primary duty of the biological control investigations which Mr. Venkatraman will make in India and elsewhere will be the survey and evaluation of natural control factors affecting the beetle, with special reference to parasites, predators and disease, and the collection, breeding and shipment to the South Pacific of those which show promise.

It is intended that Mr. Venkatraman should work initially in the Travancore-Cochin-Malabar-South Kanare area for some months, until the onset of the monsoon. After that he will work on the east coast of India for two to three months, then, possibly, investigate conditions in Ceylon. The remainder of the first year may be devoted to work further up the west coast of India, then on the east coast, ending in Assam.

An outline of this exhaustive programme of investigation was made by Mr. Dumbleton, following a visit he made to the area early this year, and in briefing discussions with Mr. Venkatraman.

Since that visit, Mr. Dumbleton has made a report to the Commission summarizing his impressions of the most likely areas for the biological control investigations. As a result of his enquiries, and impressions in India, he concluded that from the climatic aspect, the areas most likely to offer conditions similar to those in the Pacific are the west coast of India, and Assam. The east coast areas, he considered, would appear to be less promising climatically and may be equally unpromising because of agricultural and demographic conditions.

Although he was unable to make extensive investigations in Ceylon, Mr. Dumbleton gained the impression that climatically the "wet zone" (south-west quarter) of the island appeared to be very similar to Pacific areas. The major part of the coconut area was in that zone, and population density appeared to be lower than in Malabar-Travancore; in some parts much lower. There were indications of numerous small forest reserves of rain forest scattered throughout the wet zone.

In general, Mr. Dumbleton considered that Ceylon appeared to be a more promising area for biological control investigations than the parts of India which he visited.

Mr. Dumbleton was promised support for the work of Mr. Venkatraman wherever he went — in India, Ceylon, Burma, and Thailand — from government departments, universities, scientific and research institutes and other organizations concerned in the growth of the coconut, and its treatment and control for pest and disease.

This has also been the experience of the South Pacific Commission, and its research and executive officers throughout the Pacific; an encouraging indication of the desire to see established a pool of information about measures to control the beetle.

The continuation and intensification of control measures, and reduction campaigns in infested areas, must be primarily the concern of the governments concerned; the aim of the South Pacific Commission is to assist with the pooling of experience and the provision of advice.

Individual governments and administrations in the South Pacific have conducted control and eradication campaigns to a large degree. The Commission's co-ordinated programme of research will supplement those campaigns; it should greatly increase the chances of future efforts succeeding, and effect appreciable economies of time and money.

A Three-Year Programme

It is expected that the programme will be spread over at least three years; little enough for carrying out the exhaustive work envisaged both in India and elsewhere in that region, in the identifying and collection of possible diseases, attractants and pest enemies of the beetle, and their testing in the field in Western Samoa.

The cost of the first year's operations is estimated at £9,000. Part of that sum will be provided by the South Pacific Commission, and part by a contribution from Western Samoa. These contributions will not cover the total costs, but the assurance of a guarantee from the Government of Fiji will fill the gaps.

The scope of the investigation, both in Western Samoa and in India and neighbouring regions, as summarized here, is some indication of the thoroughness of the plan envisaged.

From the probable original home of *Oryctes rhinoceros,* where for some so far unexplained reason the incidence of the pest is limited, to its new habitat in the South Pacific, where it has proved destructive, the hope is to send and establish some agency that may prove an effective destroyer.

Never before has such a comprehensive investigation been planned, or attempted. Results cannot be looked for quickly, nor are they expected.

One effort to isolate attractants from palms has proved unsuccessful. Materials prepared and tested with the co-operation of Dr. M. Sutherland of the University of Brisbane, gave no indication of containing an attractant.

That is not to say that attractants may not be one possible solution of the problem. Dr. Cumber is to carry out tests with a number of chemicals as possible attractants, as one part of his work. But it is only one part of the work, both in Western Samoa and India.

In his first report, dealing with his initial activities, for the period 15th January to 28th February, Dr. Cumber said that he was mainly concerned presently with examining the beetle-trapping system used by the New Zealand Reparation Estates, whose officers have greatly assisted him in the settling-in period.

Dr. Cumber indicated in this first report intention to carry out shortly, trials on the recovery of beetles from the crowns of palms, and also to study alternative breeding sites.

The two entomologists appointed to do the field research and investigations of this campaign would deny the drama of their work. Mr. Venkatraman, searching for the possible natural enemies of this destructive beetle in the rain forests of Assam, and the great coconut areas of southern India and Ceylon, and Dr. Cumber, working on the data and specimens which it is hoped will be sent to him as the campaign progresses, would say rather that patience and care will make up their daily life in the next three years.

The possible drama from the results of their work is in the appeal they have, and the anxious questions they raise, for the coconut grower of the South Pacific. Be he large estate owner or native grower, he more perhaps than anyone else in the South Pacific, voices hope that the work now begun will succeed.

Above: A woman of Busama Village, near Salamaua, Papua and New Guinea, preparing a taro garden with digging stock. Primitive, traditional ways of growing subsistence crops are still generally followed by indigenous peoples of the South Pacific.

Right: A student of Port Laguerre Farm School, New Caledonia, demonstrating a garden rotary hoe at a field day for native teachers. Institutions such as this are doing valuable work throughout the area in raising standards of indigenous farming.

Higher Yields From Smallholdings

The world over, efficiency of production from smallholdings is commonly low compared with that from large, well-managed estates, and there is urgent need for substantial improvement. These points were stressed in a speech given by SIR GEOFFREY CLAY, *Agricultural Adviser to the United Kingdom Secretary of State for the Colonies, while attending a dinner given during the Cocoa Conference held in London last September. Part of his speech appears below.*

IN agricultural production there are the technical problems, the solution of which must rest on the results of research in the fields of plant breeding, plant physiology, plant pathology, soil science, and the like. But equally, or perhaps more important, particularly in the case of peasant agriculture, are the organizational problems—that is, the disabilities in the pattern of peasant agriculture which militate against the adoption of some of the results of research.

This problem of the wide difference between results obtained at research stations and those obtained by the ordinary farmer of a country under similar climatic and soil conditions is one which is not peculiar to the Colonial territories, nor indeed to small peasant farmers. As I go about the world, I am impressed by the wide differences which are commonly to be found between the yields of crops produced under well-capitalized, well-organized, well-managed estate conditions and those obtained under similar conditions of soil and climate by small independent farmers; and whilst in these days, when the world is crying out for increased production and there is an increasing pressure on the land resources of the world for agricultural production, this gap may be regarded as a safety margin, the reduction of which would lead to large increases in overall production, the reduction of this difference between well-organized production and the scattered production of small farmers is a matter of urgency if the food supply of the world is to be secure.

As you are aware, the normal machinery for carrying the results of research to the farmer is the development of extension services; and in all the Colonies extension services, comprising senior staffs and locally-trained subordinate staff, are well established. But the technical advances made possible as the result of research would appear to fall into two main categories. In the first are those simple improvements such as spacing, attention to weeding, the use of improved varieties, the application of fertilizers, and such other techniques which it is within the competence of the individual farmer to adopt of his own volition, in many cases without any additional labour and also in many cases without any additional expenditure on

his part. On the other hand, there are many techniques, particularly nowadays arising out of research, which the individual small farmer finds either economically or technically difficult to adopt.

Essentials of Efficient Agriculture

The essentials, in my view, of efficient agricultural production rest on land, labour, capital and management. The efficiency of production is largely determined by the absence or quality of any one of these four components. It is in this analysis, I believe, that we may find at least one explanation of the lower standard which invariably appears to be associated with unorganized small-scale peasant agriculture, be it the annual crops in the savannah zones of Africa or the perennial crops of the forest zone, such as rubber in Malaya, coffee in East Africa, cocoa in West Africa and the West Indies, or indeed the oil palm industry associated with West Africa.

For example, in the well-organized estate production of rubber in Malaya using budded selected clonal material, yields of 1,000 to 1,200 lb. of dry rubber to the acre are not uncommon, as against the 400 to 500 lb. from smallholder rubber producers; yields of up to a ton of palm oil to the acre are being obtained in some parts of the Colonial Empire under well-organized estate production, as against a quarter of that yield or less from natural palm stands or from peasant plantations. And in the case of cocoa, as members of this conference will realize, yields of as much as 1,200 lb. of dry cocoa to the acre are being obtained by the intelligent use of clonal material as opposed to yields of less than 500 lb. from seedling cocoa in West Africa.

Similarly, in the field of annual crops I have seen in one Colony well-organized European maize farming producing over fifteen bags to the acre of this crop, and side by side, under similar conditions, small-scale peasant farmers producing an average of two and a half bags.

The conclusion to which I come is that in this analysis of maximum production the two vital elements of capital and management are, in most cases, missing from peasant farming systems. It is, therefore, along the lines of a discussion of possible means of providing for these two vital elements in increased agricultural production that I would wish to devote the remaining part of my speech this evening. As your President said in his speech, I ventured at the Cocoa Conference in 1951 to sketch briefly my views on the sort of organization which might be possible under peasant production, particularly of perennial crops, aimed at re-organizing peasant producers into a medium suitable for the injection of capital on an economic scale and for the application of efficient management, ultimately, one hopes, developed as autonomous management through the medium of a co-operative development.

I am fortified in the suggestions I would wish to make by the stimulating discussions which we have recently had at the Conference of Colonial Directors of Agriculture held last week, through the courtesy of the governing body, at Wye College in Kent. One of our major topics of discussion was means of increasing peasant agricultural production. It was unanimously agreed that the present pattern of unorganized, uncoordinated, fragmented peasant holdings, although in the past it has, in the aggregate, produced a large volume of exportable produce from the Colonies, cannot lead to the substantial increases needed to raise still further the standard of living of Colonial peoples or provide the wealth from which to develop expanded social services, communications and other activities of a progressive government.

We agreed as a conference that all departments of agriculture should constantly be thinking out and trying alternatives to the present pattern of peasant production, and that they should not be discouraged by failures in some of these trials.

Another point agreed on by the conference was that advantages were to be gained in any territory by a balanced mixture of large-scale commercial agricultural production units, side by side with peasant producers. Even in Nigeria we have recently heard of development and production boards embarking on commercial estate production based on paid labour. So far, well-managed commercial estates in the Colonies, particularly those engaged on perennial tree crop production, have had their indirect influence on peasant producers by virtue of the fact that the practices and the experiences which the indigenous population has acquired as paid labour have been transferred and absorbed into the peasant production of those crops by such labour returning to their own individual farms. I believe, however, particularly in the case of perennial tree crops, that there can be a more direct benefit given to peasant producers by private enterprise, thus efficiently developing many of these perennial crops in the Colonies.

Many of us have for some time held the view that some form of partnership, possibly on a share-cropping basis, possibly on a direct rental basis, should be considered in the organization and development of peasant agricultural production. And more and more, in the thinking of some of us, at any rate, we have been attracted to the conception of the grouping of peasant farmers into an organization into which it would be possible to inject economically the capital required for the adoption of modern techniques and the essential management which, as I said earlier, I regard as one of the fundamental components of sound agricultural production.

A Mosquito Control Experiment in Netherlands New Guinea

TOWARDS the end of 1953, an experimental project to determine the value of the residual spraying of houses with insecticides as a method of malaria control in Netherlands New Guinea was initiated. The research, which is to extend over a period of six months, is under the direction of Professor van Thiel from the University of Leiden, Holland, in conjunction with Dr. D. Metselaar, Head of the Government Malariological Service in that territory. The results of these investigations will be published towards the end of this year.

The Commission arranged for Dr. Black, Malariologist of the School of Public Health and Tropical Medicine, Sydney, to visit Netherlands New Guinea in January-February last to discuss the experiment with Professor van Thiel and Dr. Metselaar. Dr. Black has carried out malaria surveys in several territories in Melanesia and his reports on the Solomon Islands, the New Hebrides and the Trobriand Islands are being issued in the Commission's Technical Paper series.

Fiji Society's Publications

THREE new volumes of the Proceedings of the Fiji Society have just been published. They contain papers read to the Society between 1941 and 1950. There is a wealth of information about old and present-day Fiji in the three volumes, copies of which are obtainable from the Treasurer of the Fiji Society, whose postal address is Box 358, Suva. The price is 25/- each or £3/3/- for the set of three.

1952 Report on Fiji

COPIES of the Colonial Report on Fiji for 1952 are on sale at the Government Press, Suva, and at booksellers throughout the Colony. Price is 4/-. The Report contains a mass of information about Fiji and is, in effect, a handbook of the Colony. It is illustrated with photographs and a folder map.

There are chapters on the history and geography of Fiji, population, public finance, commerce, production, social services, the judicial system, public utilities and public works, communications, information services and the armed forces. A reading list and a list of official publications and maps are included.

Practical Aspects of Malaria Control

An important landmark in the progress of malaria control was the First Asian Malaria Conference organised by the World Health Organisation at Bangkok last September. Malaria is a problem of great importance in the countries of South East Asia and the Western Pacific. Of the total population of 590 millions of these areas, half had hitherto lived under conditions of exposure to malarial infection. It was estimated that in 1952, as a result of malaria control schemes carried out in endemic areas, over 47 million people were being protected against malaria.

Dr. M. O. T. Iyengar, Commission Specialist on Mosquito-borne Diseases, who attended the Conference as a Commission observer, has recorded the following observations on the practical aspects of large-scale malaria control operations, such as organisation, financing, training of personnel, staffing and technique, which were the main items of discussion at the Conference. These should interest all concerned, directly or indirectly, with the effects and control of malaria in the South Pacific.

THE experience of the various workers showed that residual insecticide spraying was the most practical as well as economical method of malaria control. The insecticide used was, almost invariably, D.D.T. in the form of a wettable powder. In the vast majority of the malarious areas, the mosquitoes that transmit malaria rest indoors and thus come in direct contact with the sprayed surfaces. In consequence they are susceptible to control, and sometimes even to eradication, by residual spraying. This method of control was found to be efficacious, even under varying conditions of terrain, climate, types of houses and habits of the people. There was no evidence to show that the vector *anophelines* had developed a resistance to D.D.T. in any of the areas represented at the Conference. The per capita cost of malaria control measures is so low that most of the communities concerned could afford the expenditure.

In a few comparatively small areas the vector *anophelines*, because of their habits of feeding and resting outdoors, are not likely to come in contact with surfaces sprayed with the insecticide. In such areas, it is possible that residual insecticide spraying may not be as effective as in the areas where the vector *anophelines* rest indoors. Certain experiments have been planned to test the efficacy of D.D.T. spraying under such conditions.

Benefits of Malaria Control

Numerous instances were given of the direct and indirect benefits resulting from malaria control. Besides a reduction in malarial morbidity and mortality, there occurred a lowering of the general death-rates and infantile death-rates. Some collateral benefits were noted in certain parts of India, as, for example, control of other insect-borne diseases like plague and dermal leishmaniasis.

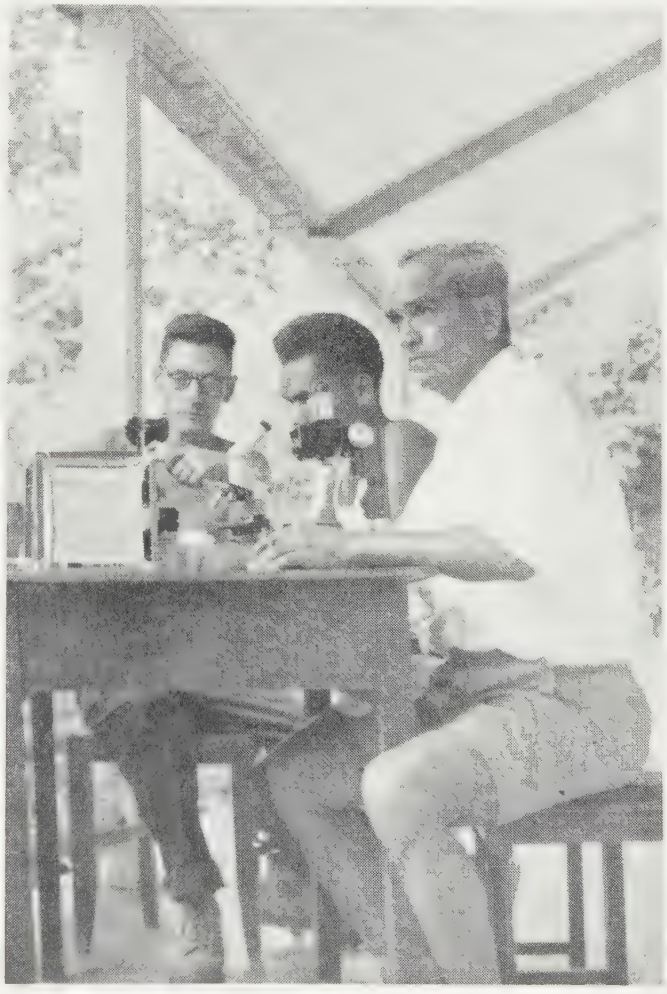
Malaria control work gave an increasing sense of well-being in the population and rendered it possible to utilize to a greater extent the natural resources of the country. The value of land increased many-fold when the area was rendered malaria-free. Large tracts of arable land, hitherto left uncultivated because of the high prevalence of malaria, were brought under cultivation, thereby increasing agricultural produce and providing employment to people. Loss of individual income through malarial sickness was prevented.

An economic survey carried out in Mysore (India) showed that for every rupee spent on malaria control work there was a return of 93 rupees by way of savings in medical and funeral expenses, increased earning, increased value of land and livestock, and reduced indebtedness. After malaria control, industrial concerns showed a larger production through increased efficiency and reduced sickness in the labour force. The construction of roads, dams, water-supply schemes and other engineering projects was made feasible and at a lower cost, as a result of malaria control. In fact, the direct and the indirect benefits resulting from malaria control are so great that "no country can afford not to control malaria."

Central Control Organization Recommended

The Conference was of the view that every country faced with the malaria problem should have a central malaria

(*Continued on Page 16*)



In the foreground is Dr. Iyengar, author of this article, engaged in field studies of filariasis in New Caledonia, as part of the Commission's work on mosquito-borne diseases.

Help For Village Industries In The Philippines

New machines, tools and experts provided by the United Nations and the United States have played a vital part in the recent growth of small industries in Philippines villages.

By E. M. OJALA*

Training programmes in the Philippines were designed to upgrade village craftsmen to become producers of saleable goods. This picture shows South Pacific wood workers in Bwoytalu village in the Trobriand Islands, Papua - New Guinea.

WHILE in Manila in November of last year attending the Eighth Pacific Science Congress the writer made a point of learning something about the programme for the development of cottage industries, originally one of the functions of the Philippine Relief and Trade Rehabilitation Administration (*PRATRA*), but now part of the work of the Price Stabilization Corporation (*PRISCO*).

The latter was founded in 1950 when, in addition to being made responsible for stabilizing basic consumer prices mainly through the operation of about 70 rural branch stores, it was directed "to study, formulate and carry out measures for the promotion of home industries". The national plan for cottage industries was to be co-ordinated by a top-policy committee responsible to the president and with provincial sub-committees responsible to the parent committee. The parent committee has not always been active, but the provincial sub-committees have done good work, chiefly because of PRISCO's national network of offices and programme of local production. The manager of the Industrial Development Department of PRISCO is Mr. Hilarion A. Pilapil, who is located in Manila.

When the programme began (in 1947 under PRATRA) it was thought that simple steps would rehabilitate the rural industries which had been dislocated by the war. Consistent with a social welfare approach, emphasis was upon buying up the village-made products as an incentive to get people back to work at their old village occupations. However, it was soon discovered that the old craft-made consumer items had lost their markets in the Philippines under the flood of imported goods from the United States. In 1951, therefore, the Government embarked on an amended programme involving survey, experimentation, training and competitive production, and approached the United States and the United Nations for assistance. The emphasis shifted from social welfare to economic production. The United States aid was channelled through the Mutual Security Agency (now the Foreign Operations Administration) and United Nations assistance came through the Technical Assistance Administration of the United Nations.

Since 1951 eight outside experts provided from one or other of these sources have been engaged in a study of the raw materials, the tools, the local skills and the old products, to see which industries could, with the application of up-to-date designing and technology, survive in world-wide competition. These advisers also instituted the training of local craftsmen in the improved methods necessary.

The types of technical assistance which were required are indicated in the following notes on the various outside experts who contributed to the programme at some stage during the last four years:

Mrs. Irene E. Murphy, Cottage Industries Adviser (United States, previously under United Nations), was responsible for administrative, legislative and programme-planning features of the project including recruitment, organization, and supervision of the other members of the team of technicians.[1]

Mrs. Marianne Strengell Hammarstrom, Loom and Textile Designer (United States), designed the "Strengell Fly-shuttle Loom" which can be built at the village level, is excellent for weaving wider widths, and suitable for weaving a variety of materials. Mrs. Hammarstrom was responsible for numerous new and successful designs of upholstery, drapery and floor coverings intended specifically for the overseas market.

John Risley, Wood Products Designer (United States), trained a number of young men to become local designers. He was responsible for designs of wood products featuring natural grains, and the virtual elimination of warping and cracking.

* Dr. E. M. Ojala is Deputy Chairman of the South Pacific Commission's Research Council.

1 This article owes a great deal to the writer's discussions with Mrs. Murphy and to his perusal of her significant evaluation of **The Philippine Program for Cottage Industries**, prepared for the U.S. Foreign Operations Administration, Manila, November, 1953.

Fijian women engaged in craft work at Nasesara, Moturiki Island.

Mrs. Mary Rice, Weaving Technician (United Nations), was the first outside specialist to assist in reviving research and training in weaving.

Miss Lysbeth Wallace, Weaving Technician (United Nations), followed Mrs. Rice in the training of operatives and worked with Mrs. Hammarstrom in the designing of new textile products and patterns.[2]

Olav Hammarstrom, Architect and Furniture Designer (United Nations), spent three months with the programme. His main contribution was the development of a new principle of constructing rattan furniture.[3]

Mrs. Mary Risley, Pottery Technician (United Nations), conducted a wide range of research tests relevant to the pottery industry, which was found to be 2,000 years behind the times, not even the potter's wheel being in use.

Max Schaeffle, Ceramics Engineer (United Nations) and manufacturer from Zurich, Switzerland, is responsible for the future development of a clay processing station, which is an indispensable next stage in the development of a pottery industry whether on a small (cottage industries) scale or a large scale.

The work of this team has reduced the focus of the cottage industries project from 1,000 products down to 5 basic categories, namely, woven textiles, woodbamboo products, clay products, fibre products and straw products. In the opinion of the survey technicians, these categories meet the tests of:

- Utilizing local and unique raw materials;
- utilizing available hand skills;
- utilizing tools which are subject to improvement;
- returning reasonable man-hour earnings to artisans.

Detailed schedules of development were worked out for the five basic industries. Raw materials for three of them—fibre, clay and wood—were to be processed by power in pilot processing stations.

The production and marketing phase has overlapped survey and experimentation, since PRISCO has for some time been operating a central display and sales room, from which are sold finished goods, craft work materials and tools. Annual PRISCO sales average 1,000,000 pesos[4], with shipments to foreign customers, mostly the United States, accounting for 10 per cent. of the total. It bears emphasis that 90 per cent. of the market for products of cottage industry in the Philippines is internal. The strongest external demand is for embroideries, rattan furniture and hemp square rugs.

In January, 1954, a planned production programme was to be initiated with a stockpile of goods for active promotion and sale. The experimental phase was to be concluded in June, 1954, and a plan made for the permanent continuance of the programme under local auspices and financing.

An important feature is the centralization achieved through the central PRISCO office and sales room in Manila. Here, new tools are tested and new designs experimentally produced and tried out on the market. When production technique is established orders are farmed out to provincial and district centres according to the availability of raw materials and skills. In this way the production is kept geared to the changing demands of the market and the availability of improved equipment.

The provision of instruction in improved methods and improved design has been an essential part of the overall programme, especially in connection with the weaving unit. The objectives of the training were to introduce new techniques, to train craftsmen to weave articles that would have a ready market, to emphasize the use of locally grown fibres, to instil an element of pride into the work and generally to "upgrade" the craftsmen to become producers of saleable goods. Training was also given in the construction of looms, in shuttle and heddle making, and in the making of coconut shell products, wood products and rattan products. The total number of trainees as at November 20, 1953, was 406. By the end of 1954, it is expected that 1,500 artisans will have been supervized into standard commercial production.

The introduction of improved equipment has likewise played a vital part in the programme. New machines or tools were imported or developed locally under the direction of the survey technicians and village craftsmen are brought to the base in Manila for training in their operation.

Hand Looms

The survey technicians imported or developed locally types of hand-looms suitable for a wide range of work. Some do coarse work such as the weaving of door mats from coir and other coarse fibres. Some will weave delicate fabrics from the finest banana and pineapple fibres, while others make grass mats. The various types of looms in use and the products which they can make are well described in Miss Wallace's United Nations report on "Hand Weaving in the Philippines", from which some of the following information was obtained.

The main aim of the technicians was to develop an all-purpose loom capable of commercial size bolts and yet simple enough to be reproduced by village carpenters from local lumber. They have succeeded in this objective. Some imported Japanese automatic cotton looms were converted to handle jute substitute fibres and have been issued to new settlements in Mindanao, where the settlers

2 Miss Wallace's report and recommendations have been published by the United Nations under the title **Hand Weaving in the Philippines.** New York, December, 1953.

3 Mr. Hammarstrom's report and recommendations have been published by the United Nations under the title **Design and Manufacture of Wooden and Rattan Furniture in the Philippines,** New York, 1952. This publication was reviewed in the October, 1953, issue of the **S.P.C. Quarterly Bulletin,** and has aroused much interest in the South Pacific.

4 1 peso equals 0.5 U.S. dollar.

will home-weave their own rice sacks.

The looms seen in action at the PRISCO headquarters in Manila included the following types:

PRISCO automatic loom—foot cycled with a capacity of 20 yards a day of plain, non-patterned cotton cloth (native Philippine looms produce 2 yards a day). This is the loom that has been converted to handling jute for making sacks. The work of operation is rather heavy.

STRENGELL fly-shuttle loom, designed by Mrs. Hammarstrom. This is an all-purpose loom for which greatly superior efficiency is claimed. With the use of a range of accessories it can produce fine material such as mosquito netting, coarse weaves for upholstery or bags, and grass or reed products such as mats, rugs and blinds. A trained weaver can weave eight to ten yards in an eight-hour day allowing for stops. It is being manufactured in Manila, where it sells without accessories for 265 pesos. If mass production gets under way, the price should fall.

GRASS loom. This is used for grass or straw strips such as are commonly employed in the Pacific for mat-making. It turns out an attractive, regular, patterned material suitable for high quality mat or basket making. The Strengell loom probably does this type of work equally well, with the appropriate accessories.

Machines for Handling Coconut Fibres

The machines that have been imported or developed for handling coconut fibre are particularly interesting. Information about them was obtained from Mr. Pedro Villafuerte, who is in charge of the Fibre Section of PRISCO's industries department. These machines, which are manufactured in Japan, will handle other coarse fibres as well as coconut fibres.

Opening Machine. Coconut husks that have been soaked in water for only 24 hours and softened by pounding are fed into this machine, which decorticates the fibre. 5 kilograms of husk can be decorticated in 45 minutes, yielding 1.25 kilograms of bristle fibre, 3 kilograms of coir (presumably mattress fibre) and 0.75 kilograms of pulp, or waste material.

A labourer working an 8-hour day can treat 48 kilograms of husk producing 13.3 kilograms of bristle fibre, 32 kilograms of coir and 2.7 kilograms of pulp. The cost of the machine, including a ½ h.p. electric motor, is approximately 400 pesos in Manila. An attempt is being made to fit foot-power to this machine.

Spinning Machine. This is simply a spinning wheel modified to handle the "coir" or mattress fibre. One kilogram of fibre can be spun into a strand of ⅛-in. diameter in 4 hours 40 minutes. The machine is operated by foot-power and costs 134 pesos.

Double-stranding Machine. This is for handling the bristle fibre. One operator feeds two streams of fibre into the machine, which spins them individually and then twines them into a double strand. One kilogram of bristle fibre can be twined into 350 yards of ¼-in. diameter twine in 3½ hours, giving a rate of 100 yards in one hour. The machine is operated by foot-power and costs 136 pesos.

Triple-twisting Machine. One operator feeds three streams of moistened bristle fibre into the machine, where they are spun and twined into a triple-stranded rope of ⅜-in. diameter. One kilogram of the fibre can be twined into 23 yards of rope in 38 minutes, the capacity being 40 yards in one hour. The machine is foot-operated and costs 172 pesos.

Balling Machine. This is used as required to ball the strand, twine or rope produced by the spinning, stranding and twisting machines for convenience of handling. It is foot-operated and costs 148 pesos.

It appears that great progress has been made in the development of cottage industries in the Philippines since the end of the war, although not all difficulties have yet been overcome. A number of factors have played an important part in the measure of success achieved. First was a Government decision, in 1946, to revive rural industries as national policy and the clear allocation of administrative responsibility for the promotion of home industries to a department, namely PRISCO, since 1950. Second was the later shift of emphasis in the programme from education to trade, from handicraft to commercial craftsmanship. Third was the engagement of outside experts bringing up-to-date technology and designing. Fourth was the selection, after authoritative survey and research, of a few industries with the most favourable economic prospects, for concentrated promotion. Fifth was the close attention paid to quality in production, achieved by central control over designing and market-testing of products, and by central training programmes in improved methods and equipment for local craftsmen. Sixth was the exploitation of the local market, the result of good designing and quality control. Thus the cottage industries are increasingly producing to the order of large local industries; for example, upholstery and furnishing textiles for the furniture and automotive trades, and sacks for the agricultural industries, meeting a need for products previously imported.

In some South Pacific territories, there are relatively large internal markets—admittedly not as large as in the Philippines—for products which cottage industries might be organized to supply more effectively; for example, bags, mats, yarns, furnishings, baskets, pottery. In some cases export markets already exist. These are the starting points for the expansion of indigenous industries in the South Pacific. The South Pacific Commission has recognized the need for technical assistance to such industries and has decided to make this the main objective of its efforts in the field of Industrial Development.

CORRESPONDENCE INVITED

The "SPC Quarterly Bulletin" is a magazine to serve the interests and needs of Pacific Islands people. Readers are cordially invited to contribute letters on topics of general interest to its columns. Photographs will also be welcomed (prints and/or negatives will be promptly returned after use).

Correspondence should be addressed to:

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Practical Aspects of Malaria Control

(*Continued from Page 13*)

control organization for planning, training of personnel, research and standardization of equipment and formulations. Control operations could be decentralized and entrusted to field malaria control staff, or integrated with general public health work.

Malaria control services should be on a stable basis and staffed by properly trained and adequately paid personnel. Running a control scheme with the aid of voluntary labour that may be provided by the communities was found to be unsatisfactory. Funds for malaria control should be provided from national, central or local sources. Financial assistance from international agencies should be accepted provided that the government undertakes to provide funds for the continuance of the work when such outside assistance is withdrawn.

In the planning of national malaria control programmes, priority should be given to areas with high malaria endemicity, those where malaria control is of economic importance, and areas subject to epidemics of malaria. There should be the fullest measure of interstate, inter-governmental and inter-regional agencies, especially where it concerns large contiguous areas with similar conditions but falling under different states, governments or regions.

Land Conservation In Fiji

NEW BOARD HOLDS FIRST MEETING

Contouring in the Tuvu River area of the Nadroga District, Fiji.

AS many Pacific territories are concerned with problems of erosion and soil conservation we reproduce the following account, taken from *News from Fiji* of the 3rd March, 1954, of the action that is being taken in that territory. (The Fiji Land Conservation Board was established under the Land Conservation and Improvement Ordinance, 1953, which was passed by the Fiji Legislative Council last July):

"The Land Conservation Board which was set up last year held its first meeting last month. The Chairman (the Director of Agriculture) gave a brief history of soil conservation work in the Colony. Throughout the years there had been demonstrations by officers of the Department of Agriculture, and these had led up to the intensive work of the soil conservation unit in the Nadi-Sabeto Basin. In the past four years the conservation staff have terraced about 1,000 acres and by field propaganda and instruction have made the farmers of the area aware of the dangers of erosion and have led them to appreciate the value of the conservation measures applied to the land.

"To assist the new Board, Soil Conservation Committees are to be set up. A majority of the members will be land owners or occupiers. Their duties will be to advise the Board on land conservation matters within the district, to collaborate with the Conservation staff in the preparation of soil conservation plans and to support the efforts of the staff by educational work among the people of the district.

"The Board discussed the question of payment for conservation work and it was agreed that after an adequate period of demonstration and instruction, any work carried out under the provisions of the Ordinance should be a charge against the owner or occupier of the land on which the work was done. The Board agreed that most small farmers would require either a loan or time in which to repay the cost of conservation work done on their property and it was decided that the method of recovery should be further discussed with the Government.

"The Board decided to give notice that it was considering issuing a Conservation Order respecting the cultivation of river and stream banks within certain distances from the water's edge.

"The Board discussed the question of the control of indiscriminate firing of grass lands and agreed that, as a long term measure, the policy of the Native Land Trust Board of leasing out, with fencing conditions, range land excluded from reserve, and encouraging tenants to plant better grasses and to conserve their grazing would discourage uncontrolled firing. The Board recommended that the efforts of the Department of Agriculture to scatter Nadi Blue Grass seed where fires have taken place should be encouraged. This grass affords fair grazing on hilly country in the dry zone and will not support extensive grass fires. It competes very well with other grasses. It is believed that the wide establishment of this grass would check the extent of fires. It was decided to recommend the experiment of appointing two full-time fire rangers in the Western District to work with the Police. The duty of the rangers will be to patrol selected areas, undertaking propaganda in these areas and prosecuting any offenders caught."

Functions of Board

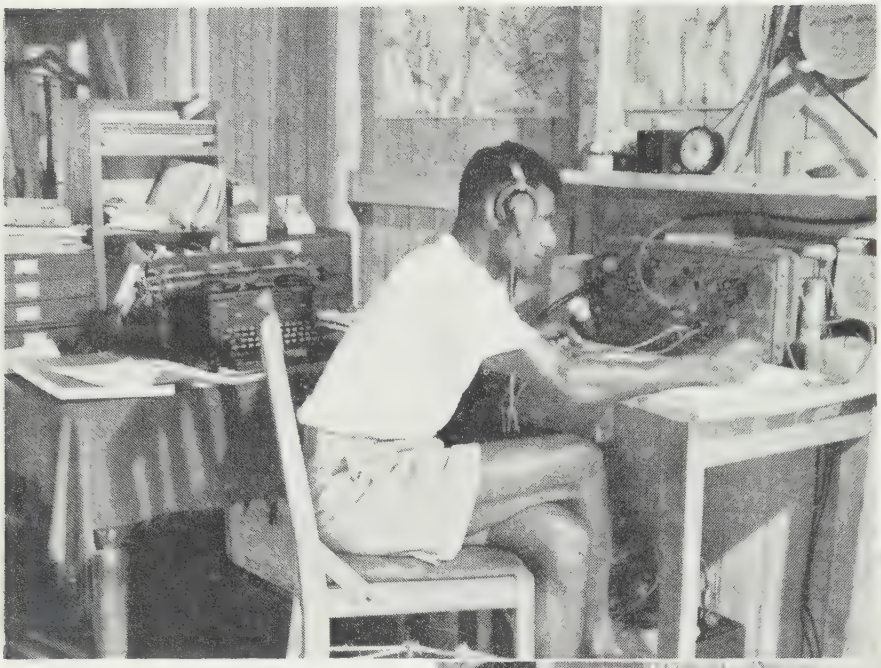
The functions of the Land Conservation Board as laid down in the Land Conservation and Improvement Ordinance, 1953, of Fiji, are:

(a) to exercise general supervision over land and water resources;
(b) to stimulate by propaganda and such other means as it may deem expedient public interest in the conservation and improvement of land and water resources;
(c) to recommend to the Governor the nature of legislation by it deemed necessary for the proper conservation and improvement of land and water resources;
(d) to make conservation orders where it deems it expedient for the conservation or improvement of land or water resources.

Such a conservation order may prohibit, regulate and control the breaking up or clearing of land for cultivation or any other purpose. It may also prohibit, regulate and control the grazing and watering of livestock; prohibit or restrict the cultivation of crops specified in the order; and regulate the method of cultivation of land.

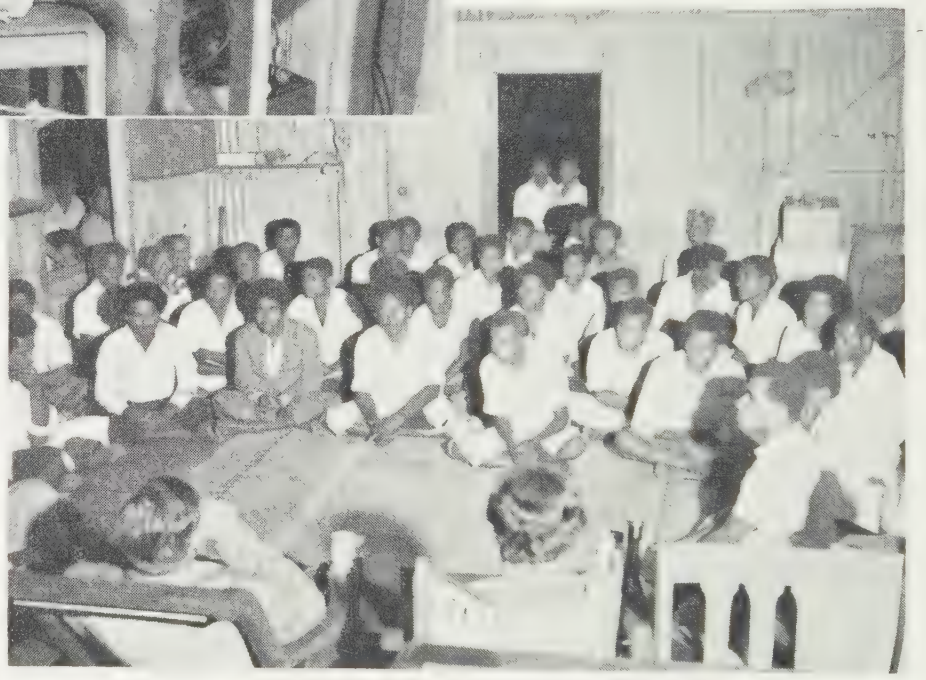
The Board may by order in writing require any owner or occupier, as the Board may decide, of any land to construct and maintain on the land such water resources as are specified in the works for the conservation of land or order.

MOTURIKI



Left: Eliki Seru, leader of the team which carried out the project. Other members were an agricultural field assistant, an assistant filariasis inspector, a forest guard, an instructor in carpentry and house building, and an assistant nurse. High tribute is paid by the author of the report to Eliki Seru's exceptional qualities of leadership.

Below: The Development Committee of Moturiki island inhabitants, and the Turaga ni Koro, or village headman, meet the Advisory Group appointed by the Fijian Government to direct the project.



ONE who reviews the work of another is confronted at the outset with some very definite limitations. In the first place, no two people can possibly bring to any subject or to any problem exactly the same set of life experiences. And in this respect, Mr. Hayden and I are no exception. He brought to the Moturiki Project an outlook and a philosophy fashioned out of a whole total of life's experiences different from my own. Hence, it is not easy to review what he has done.

I have never met Mr. Hayden. I have never had an opportunity to visit the Moturiki Project. All I know about either is what I have read of the various progress reports, and now the final concluding report, of this very dynamic activity in human improvement. In this field of community development, Mr. Hayden and I seem to have a common meeting ground. For each of us believes considerably in other human beings, in their capacity for growth, given a propitious set of circumstances, and in the belief that human growth and development are best encouraged in any given environment as the people concerned participate both in purpose and activity in their own progress.

Here it seems to me is the crux of the conflict between two ways of life seeking ascendancy to-day. One would impose its will from above following the leadership principle, as exemplified by its titular leaders. The other, if it is to be successful in capturing the imaginations of men, must capitalize upon the sum total of the creative activities of its active members. Where can this be better accomplished than in the community itself? For what a culture is depends upon what people think, believe, and do in the various communities which make up that culture. It would seem then, that the best hope for the democratic world lies in these "grass-roots" movements; that it is the part of wisdom to start with current problems found in local communities if the free world is to move effectively into action on the many and varied problems in the many and varied cultures that compose it. This approach is even more important in those other cultures which lie to-day in that "no man's land" waiting to join that camp which can attract them most.

The fundamental education or community development movement is such a "grass-roots" approach. It starts with the thesis that improving a culture means improving local communities and that education, broadly conceived, has a part in such improvement.

Here then is a new concept of education—one that is not synonymous with formal schooling; nor is it equated with teaching and learning as primarily processes of memorizing subject matter. Rather is it one that accepts that there can be no higher educational act than that of the people of a community participating and co-operating to solve problems in community life. In this kind of education educators are needed, first, with vision; second, with ability to further vision; and third, with courage to follow through—to see that the application of vision makes a difference in community living.

In all these respects Mr. Howard Hayden, the Advisory Group for the project, and the Fijian team which went forth to implement the project possessed the prerequisites of fundamental educators. That they did not rely alone on vision is well exemplified by all the steps they took to the actual implementation

A Pilot Project In Community Development

With the above title, a report on a pilot community development project carried out on the island of Moturiki by the Government of Fiji, with Commission sponsorship, has just been published for the Commission by Oxford University Press. The author is HOWARD HAYDEN, *who was Director of Education in Fiji at the time of the project. He was Chairman of the Advisory Group appointed to direct it. His report is reviewed in the accompanying article, by . . .*

Dr. R. E. GIBSON

Director of Education, United States Trust Territory of the Pacific Islands

of the project itself.

Being inspired by the possibilities he saw in community development as a means of bringing education to bear not only on the child, but also on the family and on the whole community, Hayden raised the matter in the Research Council of the South Pacific Commission and the Commission subsequently endorsed a pilot project designed to demonstrate the method in a selected community in the Fiji Group.

Moturiki was selected because in the words of the author it offered "a very suitable field for a small pilot project and as an island it offered a finite field for experiment". Two weeks after its acceptance by the South Pacific Commission, Mr. Hayden was in Moturiki informing the people that their island was being considered as a possible location for the project and enlisting their support for it. He remarks that "the people appeared to welcome it".

Then followed the preliminary planning in which Mr. Hayden presented a draft scheme, envisaging a project to be carried out through the combined efforts of the community itself and a team of specially trained native leaders. It further outlined possible aspects of development and methods to be followed. The project was planned by an advisory group consisting of the author, who was at that time the Director of Education; the Director of Medical Services; the Director of Agriculture; a District Commissioner; and a representative of the Fijian Affairs Board. The planning was done at Suva apparently with only one Fijian leader taking part.

At this point I wish to make my first critical analysis of the project. And I hope Mr. Hayden will accept my criticisms as being of a constructive nature. It would seem that despite its best intentions, this project often constituted "planning for" rather than "planning by" the people most concerned. Neither the Moturikians nor the specialists who were afterward to implement the plan in the field (who might be in a position to know) were consulted (at least in the initial stages).

I would like to assume certain prerogatives of the reviewer and state some principles regarding community development which have evolved from experiments in many different parts of the world. One of these is that any programme and planning should be adjusted to one over-riding authority—the authority of the situation itself. While the people of Moturiki might have seemed ready to welcome Mr. Hayden and to accept his advice, they had the right of final judgment, and it seems to me that any outside expert in community development should defer to this final judgment of the people to be developed. At least he should give to their knowledge and judgment equal status with his own.

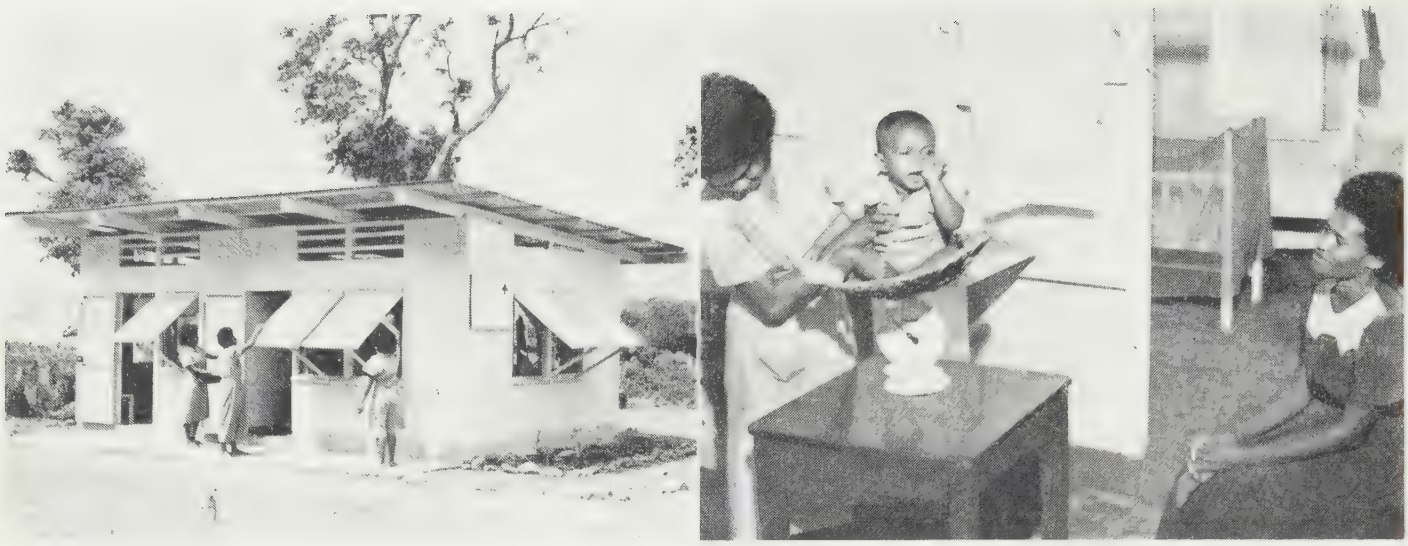
This viewpoint presupposes that the community development officer has the ability to learn from the people and does not seek to impose his own judgment upon them. It also rules out detailed planning in advance for the community for the very good reason that preconceived plans tend to make the community officer too committed to his own ideas of what the community needs and of ways to meet these needs. It could be that the preplanners define for themselves what the community's problems are. The next logical step is to provide the solutions and finally to manipulate the community into accepting both the problems and the solution.

This is not community development as I have previously described it. What we want ultimately to do is to make the community less dependent on the administering agent. We want to stimulate people to the point where they are willing and able to identify and solve their own problems. Externally conceived goals are liable to defeat such ends.

Mr. Hayden and his Advisory Group gave a proper and very important place to the gathering of facts about Moturiki before the project itself started. These facts should pertain to the three important elements in any community: What are the natural and physical resources which a community has? What are the human resources? And what are the man-made resources, which we call social organizations and social institutions which all communities have? Such facts were gathered preliminary to carrying out the experiment.

The survey was carried out by selecting a team of Fijians comprised of a leader and co-operative officer; a woman instructor for homecraft and handcrafts; an assistant nurse for maternity and

Aporosa Rasavulu Duwai, the team's instructor in carpentry and woodwork, gives a lesson in the new workshop at Nasauvuki.



Left: The new clinic and maternity home at Navuti, built during the project. Pre-fabricated in Fiji, it was erected by the people of Moturiki. The clinic was opened in April, 1951. By the end of that year over three thousand visits by out-patients had been recorded, and fifteen babies had been born in the maternity ward. Right: A small visitor is weighed while his mother watches proudly by.

infant welfare; a filariasis officer for hygiene and public health; a field assistant from the Department of Agriculture; a forest guard; and a carpenter and housebuilder.

With only six days of orientation regarding their fact-finding functions, the team set out for Moturiki on 14th February, 1950, and spent more than three months, or until 31st May, in analysing twenty-seven aspects of life on the island. Broadly, the survey was organized under the following heads: (1) Social, (2) Education, (3) Agriculture, (4) Forests, (5) Health, (6) Houses, and (7) Women's Occupations.

The author would have added considerably to the literature of community development by elaborating on how this study was left to the survey team, and how far it was determined by survey forms and constructions prepared for them. It is important to know how the facts were gathered, especially how a group of people untrained in the ways of the social scientist were suddenly able to do a thoroughly scientific job of collecting detailed information about the people, the conditions under which they lived, and the problems confronting them.

One cannot help wishing that an anthropologist could have been attached permanently to the team. Mr. Hayden admits this lack of continuous assessment of the reactions of the people of Moturiki to the project. This an anthropologist could have provided. Moreover, one of the requirements for community development is that attitudes, institutions, and organizations that set up obstacles to change need to be modified; and that those attitudes, institutions, and organizations which facilitate the fullest expression of individual capacities need to be developed. In this connection, too, an anthropologist could have been a definite asset. His help would also have been invaluable in the information-gathering stage.

I do not want to leave the impression that all the planning was done by the Advisory Group. Planning was undertaken by the team in conjunction with the people of Moturiki at the end of the preliminary survey and just before they returned to Suva. They brought with them not only the completed survey, but also a plan for community development based on their findings.

This planning with the people is important. In community development we are interested in the process as well as

Left: The church at Nasesara when the team arrived. Right: The church rebuilt on a new site.

in the product. And the process is intimately concerned with whether an increasing number of people are becoming aware of their common needs and of the common resources available to meet them and have learned to participate as a group in meeting them. It is only as this happens that community development is taking place.

The people made many proposals which were incorporated into the development plan. Near the end of the project there was further planning with the people to insure that they would carry on following the withdrawal of the team. That they did not always carry on, Mr. Hayden freely admits. In fact, a later visit by Eliki, the Fijian leader of the team, shows that only a limited number of projects were being continued by the Moturikian Development Committee which was left in charge. Eliki attributed this in general to lack of leadership on the island. But community development projects should provide a means for carrying this leadership right through to the people who do the work. It is not only a question of leadership at the top and leadership to stimulate action by the people through workers at the village level. It is even more the stimulation of leadership among the people themselves and the establishing of organizations so that this leadership can function.

The author in his conclusions makes no attempt to gloss over the mistakes and failures. In this respect he has been a true social scientist, for it is the way of the scientist to learn from his mistakes as well as from successes. He describes no glowing tale of unqualified success, for the main objective of the project was not primarily the development of Moturiki so much as it was finding better ways of working with people. In this respect this can truly be called a project in community development.

In closing this review I wish to reaffirm the final statement by the author: "This report is honoured by a Preface written by Sir Lala Sukuna, Secretary for Fijian Affairs." This gentleman has added literary genius to scientific objectivity in giving us a most impressive view of his native land. I would far rather take the evaluation of this brilliant Fijian concerning this project than anything I have written. He writes in the final paragraph of his Preface:

> "In foreseeing and summing up the main difficulties ahead and in deciding how to meet them, they have scored a striking success; that they overcame prejudice is obvious; that they succeeded in gaining the confidence of the people there is no question; and that they have done an excellent job no one can gainsay . . . If I may, I should like to offer my congratulations to Mr. Hayden and his team . . . not only for what they have achieved, but also for the new avenue of development they have so ably demonstrated."

Mr. Hayden may well accept this as a richly-deserved summing up of his pioneering contribution to the field of community development.

MOTURIKI: A Pilot Project in Community Development, by Howard Hayden. Issued under the auspices of the South Pacific Commission. Melbourne, Oxford University Press, 1954. 42/- in Australia. xxiv + 180 pp., 32 plates, 6 maps and plans.

FIBRE AND HARDBOARD FROM COCONUT HUSKS: Recent Philippines Inventions

By E. M. OJALA

MR. Martiniano Floro of the Institute of Science and Technology, Manila, has patented a machine for defibring coconut husks without the necessity of retting before treatment.

The husks, after removal of the nut, can be fed into the machine, which scrapes off the coir dust and short fibres, leaving clean bristle fibres. The machine, which is operated by four persons, can treat 25,000 husks in 24 hours, producing 3 tons of coir fibre and 6 tons of coir dust and shorts. Power is provided by an electric motor of 10 to 15 h.p. The first model, complete with motor, cost 15,000 pesos, or $7,500, to construct.

Pieces of coconut husks to be defibred are fed into the machine manually or by other suitable means, the husks being placed transversely between endless chain conveyors which grip the husk tightly in the centre, leaving both ends projecting freely. The chain conveyors carry the husks against a rapidly rotating conical drum with projecting spikes, which scrape away the material of the husk over the length exposed, leaving the clean, long fibres.

At this stage the husk has been cleaned for almost half its length. The chain conveyor carries the half-cleaned husk to an overlapping conveyor which takes a new grip of the husk by the clean fibres, leaving the untreated end of the husk projecting freely. This is then carried against another spiked rotating drum which cleans the remaining half of the husk, and the completely clean fibres are delivered at the discharge end of the machine. The coir dust and short coir fibres which drop from the scraping drums are collected at the bottom of the machine.

If the mixed coir dust and short fibres are fed into a winnowing machine, a second-grade mattress fibre can be separated out, leaving only the coir dust and waste fibres. The winnowing machine used by the Institute cost 5,000 pesos to construct. It requires a 5-7½ h.p. motor and one operator. At this stage the coconut husks have been separated into roughly 15% by weight of bristle fibre, 15% mattress fibre and 70% coir dust and waste.

One defibring machine is in commercial operation at Alaminos in Laguna Province. The operator is paying farmers 3 pesos per thousand husks delivered at his factory and sells the bristle fibre in Manila at 80 centavos per kilogram and mattress fibre at 45 centavos. The coir dust, etc., is being thrown away and its accumulation is an embarrassment.

Mr. Floro, in conjunction with Mr. Dominador J. Tinio, also of the Institute, has now patented a process for manufacturing construction materials, notably hardboard, from the coir dust and waste fibres.

It was found by experiments that the wastes (coir dust and shorts) from unretted coconut husks treated by the defibring machine contained sufficient lignin to produce, when properly dried, pre-formed and compressed between metallic hot plates, a very hard and strong construction material, without the further addition of any binding substance. By construction material is meant ceiling board, wallboard, flooring and roofing materials. This material can be produced in flat or corrugated sheets in the sizes desired. It is claimed that it will not shrink or warp and can be sawed, planed, nailed, drilled, glued and finished.

A hot plate hydraulic press is used with a capacity of 2,500 lbs. per square inch. A maximum pressure of 2,000 lbs. per square inch is required for the production of hardboards and 500 to 1000 lbs. per square inch for soft or insulating boards. I was unable to obtain an estimate of the capital required to establish such a plant.

The coir dust and waste from two coconut husks will make 1 square foot of hardboard 3/16" thick.

If these machines and processes can be developed commercially and the indications in the Philippines seem favourable, it would be possible with a not over-large investment of capital to establish an industry producing in 24 hours from 25,000 coconut husks, 3 tons of coconut fibre (bristle and mattress) and about 12,500 square feet of hardboard 3/16" thick.

There should be one or two regions in the South Pacific islands where coconut palms are sufficiently concentrated to enable this type of industry to be developed, producing fibres for export and construction materials for local consumption or possibly for export. Costing details of course would have to be worked out carefully and the modifications required in existing plantation practice would have to be assessed.

Teachers Take Course In Health Education

Last December, Dr. G. Loison gave two educational lectures to about thirty native school teachers from New Caledonia and the Loyalty Islands who had assembled in Noumea to take a refresher course. This provided an opportunity for the Commission to test health educational material it had developed, and to assess improvements that could be made in current methods of health education in use in the area.*

Dr. Loison (second from left) giving a microscope demonstration to the teachers attending the refresher course.

THROUGH the Second Commissioner for France, the Secretary-General received a request from the Administration of New Caledonia for participation by the Commission in a preliminary experiment in this Colony. The proposal was that a number of ideas on problems of nutrition, hygiene and control of endemic diseases might be collected in the form of demonstration lessons which the teachers responsible for the education of the young natives might then give in the tribes and villages.

During the five hours of these talks, Dr. Loison spoke of the causes, the symptoms and particularly the control of the principal diseases encountered in New Caledonia; especially tuberculosis, leprosy, and intestinal diseases. He stressed the danger from faeces (Salmonelloses, dysenteries, helminthiases and particularly hookworm disease).

Speaking of epidemiology in general, he described how, spreading from one infected person, the germ can contaminate a whole family, a whole village, and the epidemic, caring little for sea expanses and reef barriers, can reach the most distant island groups. He also said a few words on the importance of local conditions (climate, ethnic and family environment, habits and prejudices, housing and clothing, diet and alcoholism). One lecture was devoted to nurition and maternal and child welfare.

These talks were illustrated by films (*Communication of Diseases, Tuberculosis, Insect Vectors, Hookworm Diseases, Village Hygiene, The Healthy Family, Child and Maternal Care*) in the course of which advice on control was repeated in more direct, vivid language, with quotations and examples suited to local geography and civilisation. There were also microscope demonstrations (microbes; intestinal worms, their eggs and larvae; drops of water; saliva; blood; stools; flies, mosquitoes, lice, fleas). An explanation was given of posters prepared by the Commission for encouraging better nutrition. A coloured filmstrip on infant diet, an experiment carried out in a New Caledonian tribe, was discussed.

The scenes which they recognized, and familiar foods for which they enjoyed finding native names (they like to know the exact European translation) were the things which retained the teachers' attention most easily. They asked many questions on the food rations (for the posters did not give any figures and, therefore, must always be supplemented by more explicit pamphlets).

But the most successful of all were the coloured cartoons. They must be adapted for each territory; the inhabitant must be able to recognise himself in them and see in them his own daily mistakes. The silent version enables the lecturer to stress the points which he thinks most important.

Dr. Loison asked the native schoolteachers to collaborate in collecting such material. They live close to the native, know his needs, the advice which he must be given and the faults which must be corrected.

In his capacity as Research Officer, he explained to his audience the aims of the Commission. He suggested what might be expected from them and what might be done for them, the information given and advice received being valid for all South Pacific peoples.

In conclusion, he emphasized that the lectures were only pretexts to impress upon them the idea of health education which, in their teaching, should play an increasingly greater role. The teacher's work was incomplete if he did not take every opportunity afforded by daily life to insist upon the methodical application of the rules of hygiene.

"When you see around you the tribe or village working in health and joy," said Dr. Loison, "you will be proud to share their happiness, for it will largely be to your enthusiasm and loyal service, as teachers aware of the benefits of health education, that they will owe it."

* Dr. Loison is Research Officer, Health, to the South Pacific Commission.

Pacific Islands Central School

This secondary institution of learning for Micronesians is located on Truk, in the United States Trust Territory of the Pacific Islands.

CICELY P. PICKERILL
Principal,
Pacific Islands Central School

A PICS vocational training class in progress.

PACIFIC Islands Central School is the only secondary institution of learning in the Trust Territory. It was organized on Guam in March, 1947, primarily to train teachers. When the Civil Administration replaced the military government there, the name of the school was changed from Marianas Area Teacher Training School (MATTS) to Pacific Islands Teacher Training School (PITTS). The programme consisted mainly of intensive courses in English and teacher education. The first class of twenty-five students graduated from the school in August, 1948.

In September, 1948, PITTS moved to Truk where the school could be administered more economically. School opened on Truk, September, 1948, with one class which was reorganized in December into junior and senior classes. At that time a Student Association became part of the programme. In addition to their regular studies, the students took an important part in the development of the grounds and the improvement of their school buildings.

Twenty-three members of the senior class were graduated in May, 1949, the last one-year class to receive diplomas. From 1949 to 1952 the two-year course was devoted essentially to teacher training.

In July, 1947, a six-week summer session was established to provide further education for graduates and others in the field of teaching. Special instructors were included from the staff of the Department of Education and elsewhere. This summer school continued during the summer of 1951, after which the PITTS instructors were deployed among the districts and intensive general education and teacher training were conducted as part of the Intermediate School summer school programmes.

In 1949 PITTS opened with twenty-nine students in a new School of Communications and fifty new teacher trainers making, with the seniors, a total of 102. Students come on a quota basis from the six districts within the Trust Territory.

The Trust Territory of the Pacific Islands was transferred from the Navy to the Department of Interior on 1st July, 1951. A new Director of Education was appointed who, with the help of those educators at PITTS, reorganized the curriculum to meet the need of Micronesians in their efforts to become self-sufficient. PITTS was changed to PICS (Pacific Islands Central School). The senior class finished its course in teacher training during the year 1951-52. Now the two-year programme is devoted to general education. Without a good working knowledge of the problems that confront Micronesians and of the tools for solving these problems, the islanders cannot do a good job in any field of endeavour whether it be teaching, agriculture, office work in the district administration area, weather or communications. It is planned that specialization in any field will take place in the home districts of the students or in schools on Truk, e.g., the Nursing School and Weather Science School.

The teaching staff and principal decided that the main body or core of study for the juniors would be "Expansion of Experience and Understanding of the Larger Micronesian Community." Two periods a day are devoted to this topic which was broken down into such units as: (1) The orientation unit—when students become acquainted with problems from other districts and other cultures. (2) The people of Micronesia, their origins and the environmental influences which operate upon them. (3) Government as illustrated in the family, clan, village, island, atoll, and district. (4) Health and sanitation with all that implies. (5) Education, its place in a subsistence and partial money economy and questions of need for education and its support. (6) All problems brought up in Student Council.

Two representatives from each core class meet with the Student Council weekly to originate and discuss problems pertinent to school living. These problems are returned to the home room classes for further discussion. The teachers are alert to guiding the students toward intelligent solutions based on the best known principles in education. This is not to say that the teachers do all the planning, and thinking, and solving of problems.

The main body of study for the seniors is based around the problems involved in "Understanding of Micronesia's Place in the World Organization." This in turn is broken down into the following units: (1) Orientation—a review of the junior unit with careful study of the Handbook and the school constitution written by a committee of the Student Council, (2) the people of the world, understanding world environmental influences, and world cultures, (3) world governments and the United Nations, (4) world health, WHO, etc., (5) education, (6) world economics.

Besides the home-room courses, special required classes are given in English,

mathematics, science, agriculture, industrial arts, and typing for about forty students. The electives include library training (our school has to take care of its own library which is run with student help); *PICS News,* reporting, editing, and publication; office training; typing; music; art; surveying for land claims; and basic weather science. We are now in the process of organizing a class in navigation.

During the year 1952-53 we had a required class in geographic facts and their influences on living, because the students had a very inadequate background in this field. This year we have in its place a required class in "Economic Understanding for Micronesians."

This past summer a group of educators from the Trust Territory along with a staff economist in Honolulu and Dr. Bond, economist from Pomona College in California, gathered in Honolulu to write a *Handbook for Economic Understanding in Micronesia,* the reasons for this being that we had concluded that education here cannot go ahead without the money to support it, and that the Micronesians have little understanding of the problems involved when a money economy becomes an important part in their developing subsistence economy. This handbook is being used as a guide in our classes in economy. Several outside people are used as consultants and speakers in our classes.

Where there is a gradual incorporation of a money economy into a subsistence economy, work habits of necessity change. Students are learning to work in different ways and on schedule. They are becoming more dependable and practical in their work habits. They are learning to plan, organize, and to see the future consequences of what they undertake. They are learning what happens to people who are always on the receiving end of largesse. They are gradually learning that to be free and to be self-sufficient, people must know how to think scientifically, plan, organize, implement their plans, and evaluate them. Otherwise they are slaves to the whims of those who do these things for them.

We Americans speak glibly of money, earnings, expenditures, and savings and assume that our students have been through the same experiences we have. At PICS we are striving to help our students understand how natural resources, work, wages, and the way of life depend upon environment. In Micronesia the resources are meagre at the present time and we must face that fact and try to increase their value. Without the money income from these resources, Micronesians cannot expect to have all the gadgets to which Americans are accustomed.

When observing the classes in operation, one may become aware of the developing philosophy of education in our school here. This awareness will also result from the way we solve dining room problems, dormitory problems, recreational activity problems, and student-teacher relationships.

A group of PICS students outside one of the dormitories.

We believe in permissiveness. We encourage the spirit of inquiry. We are glad when our students are secure in their right to make constructive criticism of what is being done here. We are happy when they do not accept suggestions merely because American teachers make them.

Through living, working, and playing together in committees and in class groups, our students are learning from each other and through the examples set by their teachers the worth of individuals. They are learning to understand individual uniquenesses and the right of everyone to feel needed and important. They are learning, as the teachers are, that human beings are more alike than they are different, and that the differences should be respected. They are learning to react on a basis of human likenesses rather than on cultural differences. This is not to say that cultural differences are disregarded. Whenever possible we get to the roots of behaviour problems by means of individual as well as group conferences.

The problematic approach is used in all our classes. To grow, to mature socially and emotionally, students are given opportunities to make choices, to weigh values. Through dynamic group discussions and seeking information from texts, etc., problems are resolved. Facts are gathered from every source and weighed before students reach conclusions. Teachers and students pose problems, ask questions, e.g., What do we need to know about the government of Micronesia? How do we find the area of a garden? We do *not* give formulas and then work out the problems. Instead teachers and students gather all available data, weigh it, use it, and evaluate it.

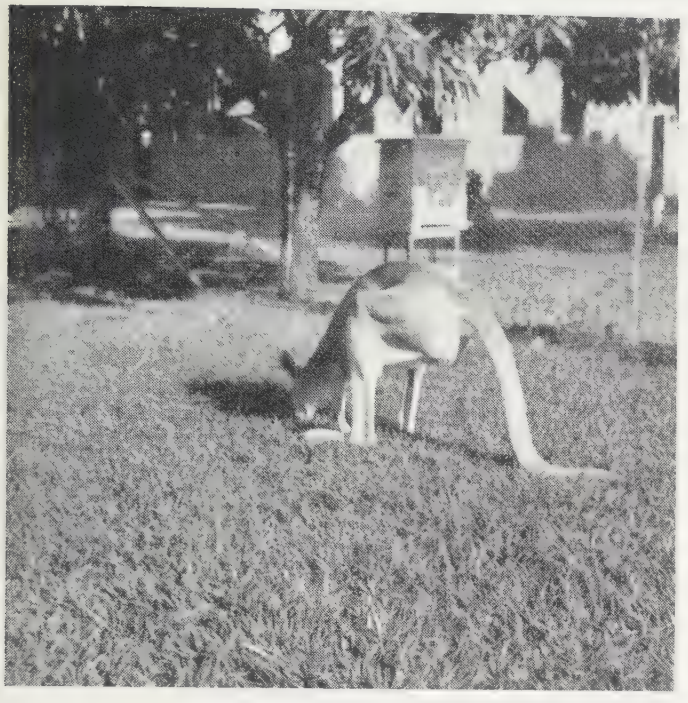
We do our best to implement democratic aims and purposes. It is true that sometimes our best is not good enough. The school is a dynamic institution where we continually reconstruct and reorganize our thinking and planning in terms of what is best for Micronesia as we see it together

Decline in Taro Disease

PHYTOPHTHORA disease of taro reached epidemic proportions in the Australian Solomons (Buka and Bougainville Islands) in the years 1947-1948, and caused such serious damage that in some cases the native people changed to sweet potato as a staple crop. The disease has continued to cause damage throughout the district, but even at the height of the epidemic certain resistant strains were noted in native plantings. Growers have been multiplying these.

The Annual Report of the District Agricultural Officer for 1952-1953 notes a considerable lessening of the incidence of the disease in various areas, and a return to this crop as a staple by native subsistence farmers. This is particularly the case in Northern Buka Island, where there is now little evidence of the disease and big areas of taro are being planted.

Plant Introduction and Exploration



The introduced Bahia grass (Paspalum notatum) is used for lawns in Katherine, Northern Australia.

Collecting wild perennial peanuts for trial in Australia, at roadside near Asuncion, Paraguay.

Planned plant introduction and exchange is playing an increasingly important role in the economic development of the South Pacific. Its potentialities in this respect are assessed in this article by a leading Australian ecologist.

WILLIAM HARTLEY

Principal Plant Introduction Officer, Division of Plant Industry, Commonwealth Scientific and Industrial Research Organization, Canberra.

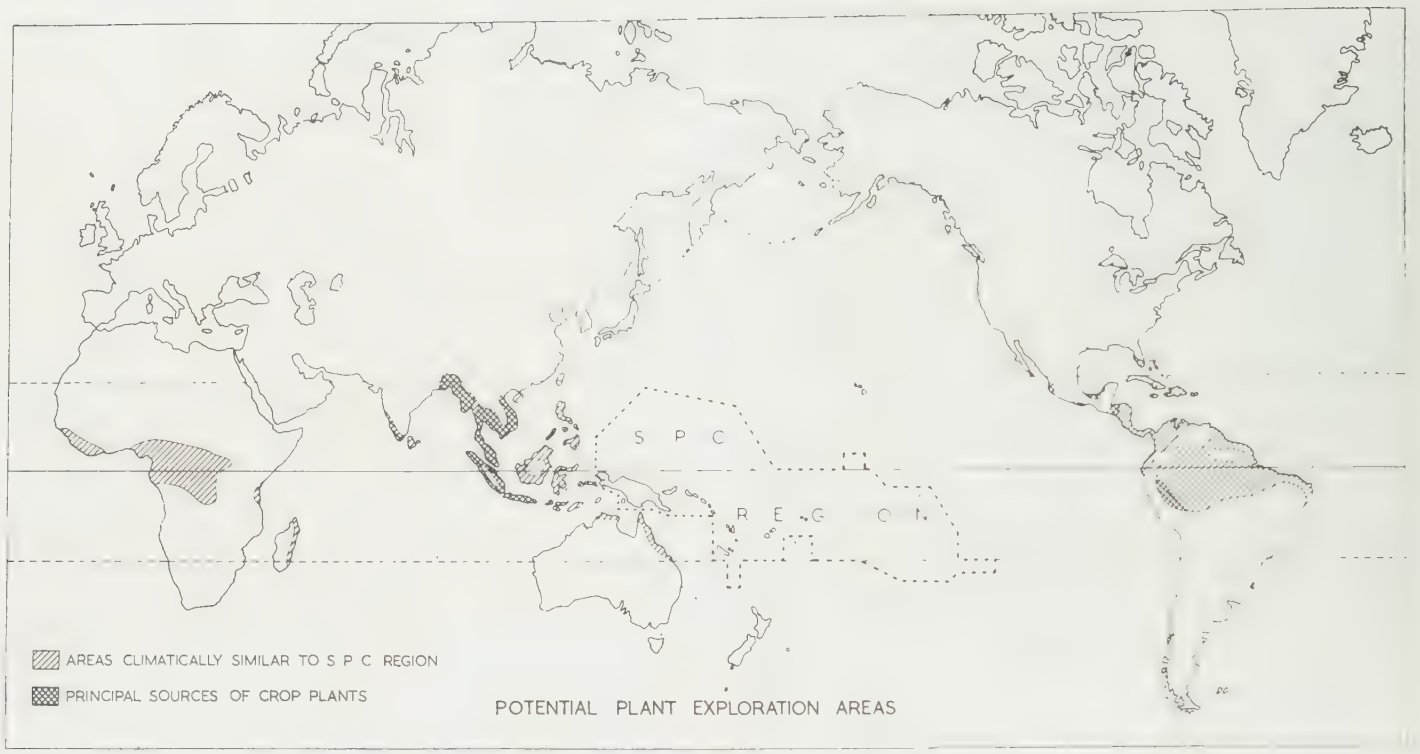
THE special significance of plant introduction for the South Pacific region was recognized in the very early days of the Commission, when a general plant introduction project was given a prominent place among the activities to be sponsored by the Research Council. This special significance stems both from the past history and the present needs of the South Pacific countries.

The natural flora of the region has predominant Asiatic and Australian affinities, and becomes progressively impoverished in passing eastwards away from these continental areas. It includes several plants which have been used by the islanders since the earliest times for food, shelter, healing and ornament, among the more important of these being taros, yams, the coconut and sago palms, pandanus, wild bananas and bamboos. Varieties of these plants were carried with them by the Polynesian and other voyagers, not infrequently over amazing distances and in spite of extraordinary handicaps. In this way the primitive crops became widely distributed, but in so doing they lost much of their diversity in the more isolated islands. The phases of wide distribution were interspersed with long periods of relative stability, during which the combined influences of geographical, ecological and cultural isolation permitted the differentiation of numerous local varieties, especially of yams and taro.

In the later period of European colonisation, most tropical crops were introduced and tested at least on the larger islands, albeit in a somewhat haphazard manner. Lasting results of this period of introduction include the establishment of the sugar industry of Fiji and the great expansion of coconut plantations. Most of the crops tested had, however, only a temporary success, and the areas under cotton, cocoa and coffee fell rapidly under the influence of competition from other regions. Only in recent years, with a recognition of the dangers of monoculture, have there been renewed efforts to establish these crops on a more scientific basis.

Among the reasons for the comparative failure of plant introduction in the South Pacific region during historical times, sociological factors undoubtedly play a part. The necessity for laborious hand cultivation has impeded the development of such crops as rice. Further, the infertility of the soil, especially on the coral atolls, imposes severe limitations upon the crops which can be grown successfully. However, considerable importance must be attached to the absence, in whole or in part, of many of the factors which have contributed so greatly to the success of plant introduction in other parts of the world. These include:

The existence of well-established and well-staffed botanic gardens and experiment stations.
Full utilization of introduced plants in plant breeding programmes.
A consistent and sustained programme of plant exploration.
Close co-ordination between plant introduction and plant quarantine.



Parts of the world most likely to yield plants of economic value to the South Pacific are indicated on this map.

The important part played by the great botanic gardens in the distribution of economic plants throughout the world, especially during the nineteenth century, is too well known to require detailed exposition.

A classical instance is the establishment of the plantation rubber industry in the Malayan region. This was due almost entirely to the work of the botanic gardens of Kew, Ceylon and Singapore. Similarly, the Cinchona industry in Indonesia had its origin in plants sent from the botanic garden of Paris to that of Buitenzorg.

With the development of agricultural research stations during the present century, these have taken over some of the functions of the botanic gardens in relation to plant introduction.

The outstanding success of the work of the Division of Plant Exploration and Introduction of the United States Department of Agriculture is due in large measure to the fact that it had the backing of well-equipped experiment stations staffed by specialists able to tackle the many problems involved in the establishment of new crops. Thus, the creation of the extensive soybean industry in the United States involved the closest integration between the phases of exploration, testing and breeding. Through successive expeditions to the Far East between 1920 and 1932, several thousand soybean introductions were obtained. Tested at experiment stations, it was found that most varieties had a narrow range of adaptability, and much selection and breeding by W. J. Morse and his co-workers was required before varieties could be obtained suited to various soils and climates.

In Australia, the importance of plant exploration as an essential element of successful plant introduction has been increasingly recognized. The Plant Introduction Section of the C.S.I.R.O. Division of Plant Industry is primarily concerned with the introduction and testing of new species and strains of pasture and forage plants. Following the initial promise shown by early introductions of *Stylosanthes* and other pasture legumes from Brazil, the writer visited subtropical eastern South America in 1947-48 together with an agronomist of the United States Department of Agriculture. Strains of *Stylosanthes* of greater cold and drought tolerance were obtained, as well as much valuable material of the genera *Desmodium, Arachis* and *Paspalum.*

Recently an Australian expedition to the Mediterranean region collected pasture plants for trial in southern Australia. The collections included many strains of important pasture species of the genera *Trifolium, Medicago, Phalaris, Dactylis, Lolium* and *Hordeum,* differing in form and physical characteristics from the forms hitherto known in Australia. The collections are being subjected to intensive scientific study, and there is little doubt that they will extend both the area and the productivity of these pasture species in Australia. At the present time an Australian agricultural scientist is seeking more varieties of these and other plants in North Africa under the joint auspices of F.A.O. and the Australian C.S.I.R.O.

Need for Close Co-ordination

The need for close co-ordination between plant introduction and plant quarantine services is recognized in the United States, in Australia, and in most other countries. It is essential to ensure that all introduced plants are adequately checked for freedom from diseases and insect pests, and that they are unlikely to become weeds. Not only may the accidental introduction of diseases and pests cause damage to established crops far outweighing the advantages to be gained from new crops, but strict precautions against the introduction of diseases may give new crops a potential productivity unknown in their countries of origin. The outstanding success of Australian species of *Eucalyptus* in Brazil and other countries far removed from their homeland has been attributed largely to their freedom from the diseases and insect pests which restrict their growth in Australia.

In considering some of the criteria for successful plant introduction outlined above in relation to the South Pacific region, it is evident that there have been serious weaknesses.

None of the great botanic gardens of the world is situated within the region. While experiment stations have been established in several of the islands, few of them have been adequately staffed and

An introduction of Phaseolus trilobus under trial at the Katherine Research Station, Northern Australia. Species of Phaseolus produce protein-rich grain for the cattle industry.

Phalaris tuberosa growing in a dry locality north of Beersheba, Israel. Extensive collections of this grass have been made for testing in southern Australia.

financed or have had sufficient continuity of development. In New Guinea, for instance, the gardens originally established by the Germans were severely damaged in two wars, and the collections so patiently accumulated were largely dispersed. Except in Fiji and New Guinea, there has been little attempt to follow up the initial introduction activities by a well-planned breeding programme, and even in these countries the work has been on too small a scale and has been carried on for too short a period to yield its full benefits.

No large-scale attempt has been made to obtain new plants of economic value for the region by means of plant exploration expeditions. It is sadly significant that the famous mutiny of the "Bounty" occurred during an attempt to take valuable plants out of the region rather than bring them in.

Finally, the disastrous period of European and Asiatic exploitation led to the uncontrolled introduction and establishment of plant diseases and pests, just as of human diseases.

In part, the deficiencies which have been indicated were inevitable. The political fragmentation of the region and the small size and population of most of the islands, made it financially and administratively impracticable to support a full plant introduction programme.

The establishment of the South Pacific Commission has opened up new possibilities in this regard, and these possibilities are being actively exploited. Through its support of plant introduction stations the Commission is doing much to ensure the provision of adequate facilities for the establishment and testing of new plants of potential economic value. The thorough studies made of the potentialities of cocoa, coffee and other crops are in marked contrast to the haphazard introduction of these plants in earlier years, and one may feel confident that they will not fail through any lack of knowledge of the requirements for success. Through its surveys of weeds, diseases and pests and its sponsorship of a regional Plant and Animal Quarantine Conference, the Commission is endeavouring to ensure that adequate precautions are taken against harmful introductions.

Possibilities of Plant Exploration

Hitherto, however, little has been done to sponsor active plant exploration to meet the needs of the South Pacific countries, and it may be useful to attempt a brief assessment of the possibilities of such exploration. These possibilities may be reviewed in relation to the agricultural, botanical and geographical peculiarities of the region. The most important of these are:

(1) The paucity of varieties of crops of extra-regional origin.

(2) The contrasting extreme diversity of some crops indigenous to the region, such as taros.

(3) The extreme geographical fragmentation into numerous islands usually small in size and frequently widely separated.

Taken as a whole, the South Pacific region has a very poor assortment of varieties of economic plants of extra-regional origin. As an instance of this, it may be noted that Tonga has only two varieties of bamboo. While it is evident that not all kinds of bamboo could be grown successfully in Tonga, and that not all bamboos are of economic or ornamental value, it is clear that immense scope exists for the search for useful varieties within this large group which includes more than 500 distinct species. This is equally true of many other groups of economic plants.

Frequently these plants must be sought elsewhere than in the South Pacific region itself.

On the accompanying map an attempt has been made to indicate the parts of the world most likely to yield such plants and hence most warranting intensive plant exploration. The hatched areas shown on the map are those which are climatically similar to the islands of the South Pacific, i.e., the areas with climatic indices AA'r or BA'r of Thornthwaite's classification. (The highland region of New Guinea, which has climatic parallels in the mountains of Borneo, Sumatra and Kenya and possibly also in the south-eastern U.S.A. and southern Brazil, is excluded from this comparison as it involves special problems.)

Superimposed on the hatched areas are shown in cross-hatching those areas which form part of one or other of the great regions of origin of cultivated plants, as defined by Vavilov. These

(*Continued on Page 35*)

World Prices of Pacific Crops

The following article is based on readings from The Times (London), The Economist, the U.S. Department of Agriculture's Foreign Crops and Markets, the F.A.O. Bulletin and other published sources of economic information received at Commission headquarters in Noumea.

By A. J. L. CATT*

A banana-packing station on the upper reaches of the Rewa River in Fiji. Here the fingers are stripped from the bunch and packed. Exports of Fiji bananas to New Zealand last year reached the record figure of 383,080 cases.

ONE of the most important factors influencing the progress of territories in the South Pacific, as elsewhere, is the state of the markets for their exports. Since the war, world demand has generally been in excess of supply and except for the 1949 recession, prices for virtually all products have been good. Even the declines which followed the Korean boom did not cause concern, for they were expected after the unrealistic levels which had been reached in the course of it.

But we have now moved into a less secure situation where further falls in prices might cause difficulties. In the case of rubber, for example, this is already so. Moreover, the development of an American recession, in view of experience as recent as 1949, is somewhat disconcerting. In these circumstances, the export and commodity markets warrant close attention in order that unnecessary concern may be averted or in order that falling export incomes do not occur without warning.

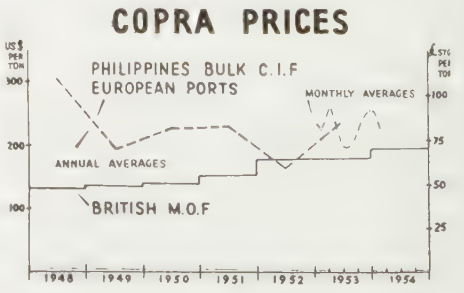
In this article a brief review of market conditions for the main exports of the South Pacific is made. Before dealing with the commodities individually, however, let us first sum up the general economic situation. Dominating it, of course, is the United States. A recession which is already rather more than mild is under way there, but how long it will last is the cause of considerable controversy. Quite definitely a fall in the output of, at the very least, 5 per cent. will occur this year compared with last year. But whether the fall will amount to as much as 10 per cent. is doubtful, for the American economy has very great capacity to expand and already it has proved the jeremiahs wrong in their prophecies of "slump". This has already been illustrated in the present case where, despite increasing unemployment and other unmistakable signs of depression, the volume of retail sales has remained at near-record levels. On the other hand, the administration is firm in its resolution not to resort to inflationary measures unnecessarily, and it is feared in some quarters that if action is required to avert a crisis it may come too late.

Turning to the situation in Europe, the outlook is much more promising. Last year production was once more at record levels after the decline in 1952, and although adverse changes in the United States would tend to have a dampening effect, further expansion in 1954 seems likely. This should ensure increased demand for raw materials, and territories supplying European markets may be reasonably sanguine except where such markets are in close relationship with American markets.

Copra

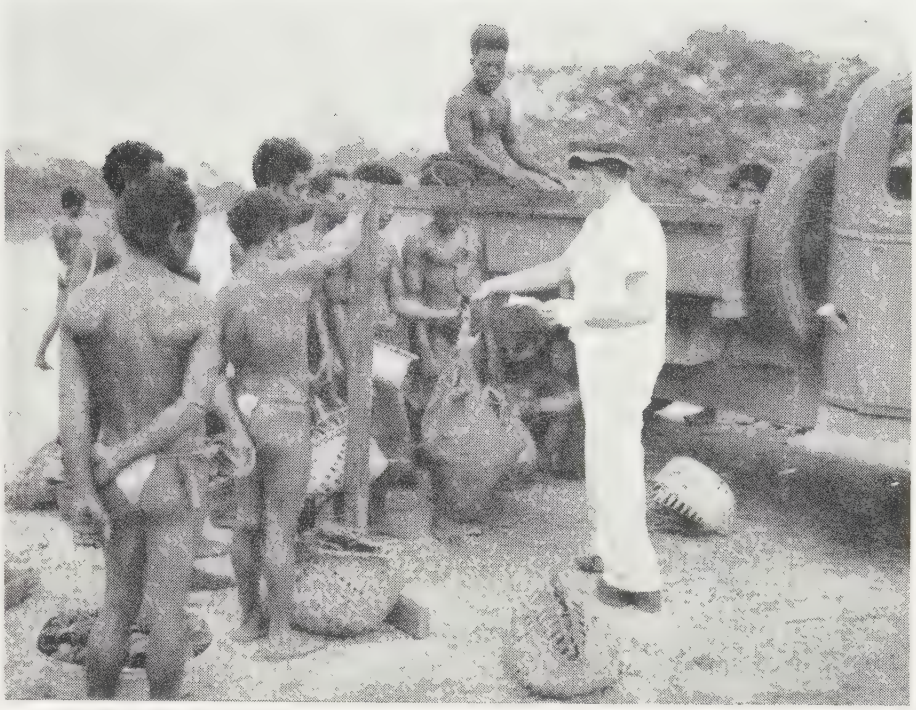
The fact that all British Commonwealth territories sell their copra to the United Kingdom Ministry of Food, under contracts which limit the annual movements in price to not more than 10 per cent., has given some stability to the income of the area from this crop, even though, as it has turned out, this stability has been achieved at the expense of receiving appreciably less than world market prices. Despite this increased stability, it is nevertheless probably true that conditions in the world markets for copra (easily the largest export of the South Pacific) deserve closer study than those for any other crop. For not only are large exports from non-British territories sold under free market conditions, but also, to a considerable extent, the U.K. Ministry of Food price is determined by trends on these markets.

In 1953 world production of copra and coconut oil declined very substantially to the lowest level since 1946, with the result that prices for most of the



* Mr. Catt is Technical Assistant to the Deputy Chairman of the Commission's Research Council.

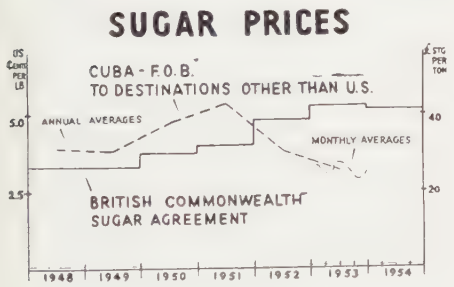
A trader buying copra from Trobriand Islanders. Copra is by far the most important cash crop of the South Pacific.



year were higher than in 1952. This year should see an increase in supply and this could have a rather depressing effect on prices. Also, conditions in the United States may cause a net reduction in world demand despite general secular expansion of activity elsewhere. Higher prices do not therefore appear likely and the more cautious of those producers depending on the free markets will make their plans in the expectation of some decline. This does not apply to British territories which have been offered an increase of 7½ per cent. by the British Ministry of Food. Although at the time of writing the new price of £70 Stg. per ton is still somewhat below the free market price (about £80 Stg. per ton c.i.f. Continental ports), the latter is declining and it appears unlikely that the wide disparity which has been characteristic of most of the post-war years will obtain in 1954.

Sugar

Although Fiji is virtually the only producer in the area, sugar is nevertheless second only to copra as a South Pacific export. Like copra, most of it is sold to the U.K. Ministry of Food under an agreement which fixes the price from year to year. The price for 1954



has been fixed at £Stg.41 a ton c.i.f., a reduction of £1/6/8 on the 1953 price. This reduction was mainly due to cheaper bags and other reduced costs, and not all, if any of it, is likely to be passed on to the producers. However, only about three-quarters of Commonwealth sugar production is sold under this agreement, the remaining quarter (about 550,000 tons) having to be disposed of on the free market at prices much below the present contract price. In order to stabilize the free market price an International Sugar Agreement has come into force as from 1st January, 1954, although it has still to be ratified by some legislatures, notably the U.S. Congress. Under this agreement supplies of sugar to the free market, except the United States, will be regulated to keep the New York price within the range of 3.25 - 4.35 cents per lb. (£26 - 34 Stg. a ton). Initially a 15 per cent. reduction in supplies is agreed upon, but if prices outside the stipulated range should occur, this 15 per cent. reduction will be varied accordingly. It is expected that about 400,000 tons of the Commonwealth sales on the free market will go to Canada at the market price plus £3/15/- a ton, which is the British preference.

The Commonwealth Sugar Agreement has been extended to the end of 1961, so that at least until then the position of sugar producers in Fiji is protected to some extent. However, the wide disparity between support and current free market prices is cause for some apprehension over the longer term prospects.

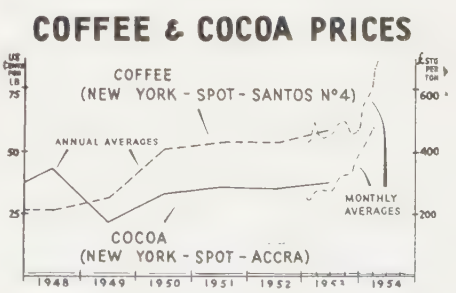
Cocoa

Since mid-1953, when the spot price for good fermented Gold Coast cocoa on the London market was about £270 a ton, a phenomenal increase in prices, on recent occasions to nearly £500 Stg. a ton, has taken place. The main reason for this boom in cocoa appears to have been the poor crops obtained in Nigeria and the Gold Coast (due mainly to plant diseases in the area) at a time when stocks were already low. For the current season production is expected to be 10 per cent. less than demand, and in the longer term, too, the outlook for the producer is extremely good. One of the causes of the general shortage is that replanting in the war and post-war periods has been insufficient owing to the unfortunate experience in the early thirties when prices as low as £12 a ton ruled. Thus the present shortage is likely to remain for at least another five years and unless there is a marked fall in demand, prices should remain good. The current record levels are not so likely to last, however, for they will tend to reduce effective demand and to encourage the use of substitutes.

Coffee

This crop also is currently enjoying an unprecedented boom. Prices have risen from 55 cents a lb. on the New York market in May, 1953, to over 90 cents in March - April this year. As a result, retail prices in the United States have reached such a level that buyers' resistance has been reported, and an official investigation has been authorized to ascertain, *inter alia*, whether unethical speculation is taking place and whether better supply arrangements can be made.

Like cocoa, however, the evidence points to a genuine current shortage of production, due partly to a bad season in Brazil this year, and also to a general failure of production to keep up with demand since the war. Coffee producers

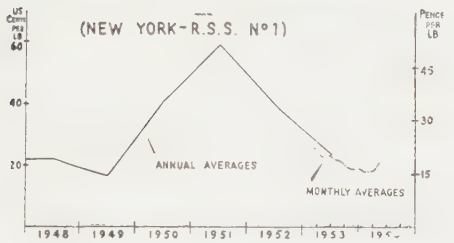


are, therefore, also in a very favourable position at least for the next two or three seasons. Beyond this, however, the situation, while still favourable, is not so clear, for already there is evidence that in the last year or two the acreage of coffee planted has increased.

Rubber

Probably the most depressed commodity market at present is the rubber market. The spot price of about 17d. a lb. for No. 1 R.S.S. on the London market (April, 1954) shows an increase of about 80 per cent. on the pre-war price compared with an increase of about 150 per cent. for raw materials in general. The major single reason for this worsening of the relative position of rubber is the development of synthetic rubber, production of which is now more than half that of natural rubber. In addition, the production of natural rubber has also increased substantially and in 1951 total rubber production, natural and synthetic, amounted to nearly 2.9 million tons compared with about 1.1 million tons before the war. With current consumption at about 2.5 million tons a year, it is clear that there is considerable excess productive capacity.

PRICE OF RUBBER



Recently, however, signs of improvement have appeared. Owing to its lower price a larger proportion of natural rubber is now being used in United States industry, while on the other hand natural rubber production has fallen, and assuming no serious decline of world industrial activity, further serious reductions in rubber prices are not likely. Conversely, marked increases also appear unlikely in the short run at least. In the longer run, the outlook is complicated by unknowns such as the possible development of cheaper synthetics on the one hand, and the possibility of increased demand, accompanying general world expansion and development of new uses (*e.g.*, rubberized road surfaces) on the other.

With these factors in view, the current situation is being closely and continuously examined by the International Rubber Study Group. But so far the situation has not become clear enough to give confidence to members of the Group, or to create unanimity among them that drastic action such as a proposed calling of an international commodity conference under the auspices of the United Nations is justified.

Fresh Fruits

New Zealand is easily the most important market for exports of South Pacific bananas, pineapples, oranges and tomatoes. In general, the demand there for these products is considerably in excess of supply, even though imports of bananas and oranges last year were at a record level. In 1954, incomes in New Zealand are likely to be as much as 10 per cent. higher than in 1953, and there seems to be no doubt that the excess demand for fresh fruits will remain. Except possibly for the United States, other markets for fresh fruits are also likely to be sound in 1954.

Summing up, it is clear that the outlook for 1954 for all crops, except rubber, is good. The main other weakness lies with those copra producers whose products are not sold under contract to the U.K. Ministry of Food, especially those who rely on the U.S. market. However, here it should be remembered, firstly, that market prices have generally been well in excess of contract prices so that they can fall somewhat before such producers are in an unfavourable position *vis-a-vis* their counterpart in British territories; and secondly, the fear of the American recession should not be exaggerated, especially in view of the absence of any heavy fall in market prices six months after the recession was first commented upon.

Nevertheless, in the longer term view it does seem that world economic conditions are getting back to "normal". One of the consequences of this would be an increased tendency for prices to fluctuate and in some cases to fall over a period. This does not mean that a slump is around the corner, that is on anything like the scale of the early thirties. But it does mean that the days are past when mistakes in business or government may be cancelled out by easy profits and increasing tax yields. From now on a spirit of calculated boldness will pay off better than the previously successful spirit of rash over-confidence.

Community Development in the Nimboran

(*Continued from Page 5*)

Much thought has been given to the development of recognized social activities such as the organizing of outdoor games, dramatic performances, educational evenings, and so forth. While small beginnings have been made, any large-scale activities of this sort will need money, which will first have to be earned through the medium of the Co-operative Society and the general economic development of the district.

In March, 1952, a schoolmistress arrived to take over the Continuation School for girls from the missionary's wife. In August of that year she was joined by a second schoolmistress, for by then nearly 40 pupils were boarded at the school.

Early in 1952 the out-patients' clinic which had up till then been conducted in the house of the district male nurse was transferred to the old Government Rest House. Thus with more space available it was possible to house those patients who had come from the more distant villages, and those who needed protracted treatment. In the course of the year it grew into a small nursing home in which even those from the nearer villages could be housed as in-patients for regular treatment or observation. Although a proper hospital is to be built by the Government shortly, the present building is already referred to by the inhabitants as the hospital.

It can be stated with confidence that the results achieved so far by the Nimboran community development project have been very encouraging and the population-drift to Hollandia, though it has not quite ceased, has been checked. Adjacent villages are beginning to copy the Nimboran development techniques on their own account.

The Commission officer mentioned above was very impressed with the healthy state of the project. "It seems," he says, "to be a pilot project in the real sense that it is providing experience, training leadership, and evolving techniques which, under the direction of the Administration, are being brought to bear upon general plans for the development of Netherlands New Guinea and its people."

Aerial Survey in Papua and New Guinea

DURING May the Commonwealth Department of Civil Aviation and the Department of District Services will make a joint aerial survey of thousands of square miles of little-known country in the Highlands and certain border areas of the territory.

Much difficult exploratory ground patrolling can be eliminated by obtaining basic information about the geography and population density of new areas from air surveys. The area to be surveyed includes most of the territory's remaining unadministered country.

If weather conditions are favourable the operation will be completed in seven days. An Anson aircraft will be fitted with long-range fuel tanks and special aerial camera and radio equipment for the task.

NUTRITION AND HEALTH: Australian and New Zealand Scientists Confer

The Thirtieth Meeting of the Australian and New Zealand Association for the Advancement of Science was held at Canberra from January 13 to 20, 1954. Prof. E. Massal, Executive Officer for Health to the South Pacific Commission, was invited to attend the meeting in the Section dealing with Medical Science, National Health and Microbiology, in which the programme included a symposium on nutrition. Papers presented in this symposium are analyzed below . . .

by Professor EMILE MASSAL

Nutrition of Special Groups

J. Woodhill (New South Wales) discussed the influence of maternal diet in pregnancy. She said that a statistically significant relationship had been demonstrated between poor maternal diets and the incidence of toxaemia and prematurity, and between good maternal diets and the duration of lactation. One goal in the public health programme to promote maternal and child health should be the education of women in good dietary practices in preparation for motherhood.

R. R. Gibson (New South Wales) quoted a case to illustrate the importance of early feeding situations in the development of gastro-intestinal disorders. The importance of the emotional environment of mother and child as a feeding unit was stressed, and the application of those principles to hospital practice was described.

Miss C. Turner (Melbourne) said that good health and happiness in old age depend on a triad of factors—physical health, social status and nutritional status. The habits of the aged had to be respected and they would not welcome abrupt changes; but experience had shown that the co-operation of the physician, the dietician and the almoner could improve the nutrition of elderly people through adjustment of the various nutrients in their diets, simple explanation, dietary instruction and continued encouragement.

Nutritional Problems in Tropical Australia and the Pacific

E. Massal (South Pacific Commission) expressed the views that nutritional problems in the Pacific islands were insufficiently known; they had but rarely been assessed, and their complete practical solution had still to be found. He gave some examples, demonstrating that nutritional problems in the Pacific islands were determined by changing conditions and local aspects: they were local problems which required local assessment and local solutions by a logical use of present resources. The South Pacific Commission was now in a position to give valuable help to the territories.

Miss D. Langley (South Pacific Health Service) said that education in nutrition had become necessary because recent field work had shown that the diet pattern of the South Pacific islanders was changing from one of native-grown foods to one that included store foods, the latter often being unwisely selected. Miss Langley described the present teaching programme and showed many of the posters and other educational material that were used. In conclusion, she said that the effectiveness of the teaching programme could be judged only by the standard of nutrition of the next generation. There was also a need for improved teaching methods which should arise out of the close co-operation of medical scientists with anthropologists, social scientists and educationists.

Miss W. E. Wilson (Canberra) reported the results of dietary surveys carried out by the Commonwealth Department of Health in 1948 and in 1951 amongst aborigines in Western Australia and the Northern Territory. The "natural" diet of the aborigines was probably well balanced. The present "civilized" diets were rated low in some nutrients: nevertheless, the aborigines did not show signs of frank deficiency disease. If the fact was accepted that the aboriginal's "natural" diet was a thing of the past, it was the white people's responsibility to ensure that he had the opportunity of obtaining an adequate diet that was nutritious and acceptable to him, and, as he became assimilated, of a type that would not differentiate him from the white man.

Diet, Nutrition and Dental Caries

"Some Dietetic and Nutritional Factors in Relation to the Prevention of Dental Caries, Including a Reference to Difficulties in Effecting Changes in Food Habits," was the subject of a paper by *Drs. H. R. Sullivan* and *N. E. Goldsworthy* (Institute of Dental Research, Sydney).

The speakers showed a film illustrating food habits which ensured the maintenance of adequate nutrition and of sound teeth. The children shown in the film had been carefully examined for dental defects since 1947. They live as a community at Bowral (N.S.W.). The average number of decayed and filled teeth per child at the end of February, 1952, was only 0.58, whereas children in the same age groups in the general population had, on an average, ten to twenty times more decayed, missing or filled teeth.

The outstanding difference between the two categories of children was in the nature of the diet. The types of food eaten by the Bowral group were: vegetables, raw and cooked; salads; fruits, fresh and dried; wholemeal cereals and wholemeal bread; milk, butter and concentrates of vitamins. The intake of sufficient protein was assured by the free use of milk, cheese, soya bean and egg. In contrast, the types of food eaten by children in the general population included white bread and jam, cakes, pastries, sweets and ice cream, sometimes at the expense of the "protective" foods, but more often in addition to them.

Evidence was adduced which showed that dental caries can be prevented by means of controlled diet ensuring rigid restriction of the amount of refined carbohydrate ingested.

Because the diet of modern civilized peoples includes an excessive amount of refined carbohydrate, the control of caries through diet involves the changing of food habits without prejudice to the nutritional status.

Effecting these changes is not easy because of: (a) the fact that the disease is neither fatal nor in the generally accepted sense crippling; (b) prejudice arising from the existence of (i) ignorance which causes people to think that such changes constitute deprivation, (ii) different social strata, whereby certain foods are unacceptable to certain groups of people, (iii) different cultural patterns, which characterize national groups whose food-habits have been fixed for generations; (c) difficulties related to (i) supply at local and world levels, (ii) cost, (iii) the innate liking for sweet foods.

An attempt was made to relate dietetic and nutritional patterns to dental structure and all three to freedom from caries.

The speakers discussed methods for changing the dietetic pattern and eating habits of a nation in the light of: (a) failure of past efforts through the assumption that direct indoctrination will be effective, (b) the teaching of dynamic psychology where emphasis is placed on endogenous motivation.

World and Australian Food Problems

F. T. Whalen (F.A.O.) gave an outline of world food and agricultural problems, with special reference to staple foods such as wheat and other cereals.

J. G. Crawford (Canberra) spoke about Australia's agricultural programme.

I. Clunies-Ross (Chairman, C.S.I.R.O.) said that the contribution of science to Australia's food production had been rather meagre in the past. Nothing had been done to explore the deep waters far off the coast as a source of fish supply for the world. On the rural side the four factors limiting food production were scarcity of water and droughts, poverty of soil, losses from plant and animal diseases, and rabbits. Science had a great contribution to make to overcome these difficulties.

F. W. Clements (Sydney), speaking on the influence of nutritional findings on the utilization of the world's food production resources, said that the task of feeding any local group was with few exceptions a problem of local production and distribution. "The production and distribution of food must be based on the nutritional needs of the people" (Lord Boyd Orr, 1941). This involved sociological as well as nutritional problems.

Dr. Clements reviewed the various recommendations for nutritional requirements, but limited his discussion to calories and protein. Adequate calories ensured satiety and an adequate supply of protein would ensure the adequacy of a number of other nutrients. Those two—calories and protein—represented the major food production problems.

After dealing with the sources of calories and proteins, he concluded by saying that the known facts about diet belonged to the "internal logic" of nutritional sciences. Those facts must be considered in relation to social life which provided the "external logic". Sociologists now recognized that foods occupied an important place in almost every culture and that selection of foods by individuals and even by national groups was governed by a hierarchy of values, including cost, health, taste, status or prestige. Developments in the nutritional sciences could not be considered in isolation, but must be analysed in the light of current international and local social environments.

Food Technology and Public Health

J. E. Excell (Melbourne) reported on: "The Development of an Improved Process for Large-Scale Vegetable Cooking". To retain the maximum nutritive value of potatoes and root vegetables they should be cooked whole in their skins or cut into portions in such a way that a minimum area is exposed. They should be pressure steamed with a minimum of contact with water, and the temperature should be raised rapidly, the cooking time being reduced to a minimum and pressure reduced slowly. Small batches should be cooked and served in the piece as soon as possible after cooking.

In order to satisfy these conditions for large-scale catering, a small batch pressure steamer has been developed and tested. This consists of an automatically-controlled steam table connected to a steam supply at a pressure of 25 pounds per square inch, with which a number of pressure pots may be used. These pots hold about 80 two-ounce serves of vegetables.

Properly used, the small batch pressure cooker minimizes the losses due to slicing, cooking and holding, and avoids the need for mashing which causes oxidation of nutrients.

The cost of the equipment when commercially produced is likely to be small, and the operating cost much less than for conventional equipment.

E. H. Hipsley (Canberra) discussed the subject of "Nutrient Additions to Bread". He traced the history of the addition of nutrients to bread in some countries and showed that the nutritional value of 60 per cent. wholemeal bread was superior to that of white bread and white bread "enriched" to the United States specifications. Dr. Hipsley then discussed the nutritional value of "milk" bread and pointed out that the terms "starch reduced" and "protein enriched" bread were misleading. Bread appears to be a suitable vehicle for increasing the use of iodized salt in goitrous areas.

E. Bond (Bread Research Institute, Australia) spoke on "Developments in Bread Baking — Chemical Additives". He said that in modern civilization, baking has developed from a craft to a mechanized industry. Although the basic ingredients and methods have not been changed, altered conditions have necessitated modifications of the basic flour-water-salt-dough by the addition of various chemicals. Most of these are oxidizing agents, used in bleaching and maturing or artificially ageing the flour to improve colour and baking quality. Some of these chemicals may have harmful effects. Dough improvement is achieved in a new process, not by the addition of chemicals, but by a high-speed whipping of untreated flour and water to incorporate oxygen in the batter. However, it is believed that even this does not completely remove the need for chemical improvers.

J. R. Vickery (C.S.I.R.O.) discussed the general principles which should govern the intentional addition of non-nutrient substances to foods and the use and limitations of the various materials and agents, with particular reference to Australian food processing. He concluded by saying that "while the use of non-nutrient additives should be permitted only after most thorough investigation and screening, it is suggested that public health authorities should display a more consistent and positive attitude to their use".

R. M. W. Cunningham (Canberra), discussing "Chemical Additions to Food as Factors Contributing to Disease", pointed out the toxic nature of many of the chemicals used in food processing. He suggested that further research should be undertaken into the use, as food colourings, of pigments occurring in nature, or of colours produced synthetically from similar groupings to those found in natural pigments or from groupings differing from those at present suspect.

Some Impressions

From these symposia on nutrition, and from discussions with the delegates to the Thirtieth Meeting of the Australian and New Zealand Association for the Advancement of Science, there emerge several impressions.

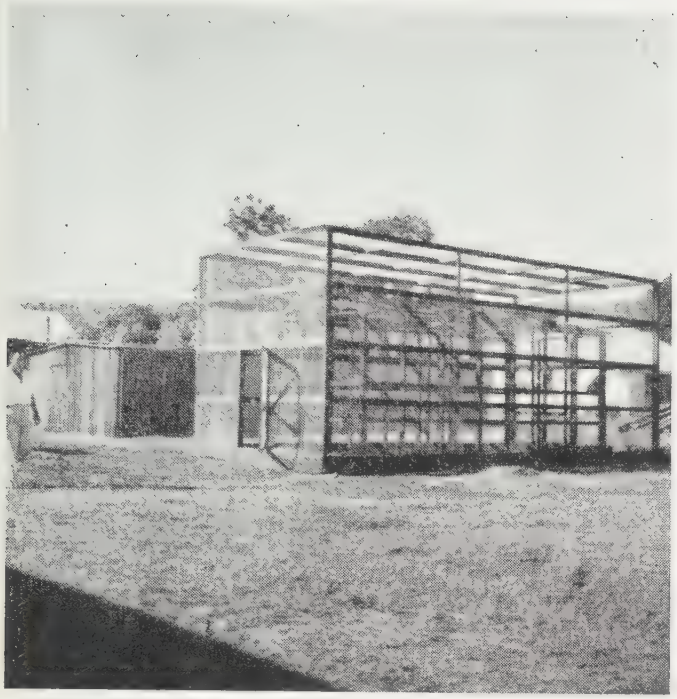
That there is a science of nutrition cannot be doubted; however, the data it provides can be applied only if special local conditions are taken into consideration. Some of these are well known or are comparatively easy to assess: economic, industrial, agricultural conditions. Others, however, collectively known as social conditions, are not so easily defined — the intellectual and psychical status of peoples, for example —as the essential basic surveys are often lacking (and even the techniques for carrying out such surveys) which would enable an assessment to be made of a social change we would like to guide, but the trends and scope of which are often beyond our ken.

It therefore seems difficult to achieve a rational and lasting improvement in local diets and nutritional status if only industrial and agricultural techniques are used; although necessary, these remain inadequate. The main effort, and this is where the task is a difficult one, should bear on the intrinsically human aspects, an effort to understand both the individual and the community.

Bananas Shipped in Cellophane

IF experiments now being carried out in Jamaica are successful, all bananas exported to Britain from that country will be cellophane-wrapped. Trial shipments of 2,000 and 3,000 bunches have already gone forward, and plans are now being made for sending a shipment of some 20,000 to 30,000 bunches, all individually wrapped in cellophane.

Shipping bananas in this manner is believed to prevent bruising and ensure a more attractive colour on ripening. Shipments already made are being carefully checked for results by the growers' organization in Jamaica, the All Island Banana Growers' Association.



External view of the humidifier in course of construction at Tuanaimato Plantation, Western Samoa.

Nursery of young clones vegetatively propagated from Lafi 7 at Tuanaimato. (Shade trees are Erythrina lithosperma.)

A SUCCESSFUL SCHEME FOR . . .

Stepping-up Cocoa Production

In the British West Indies, free distribution of high-yielding clones to cocoa planters by the Department of Agriculture is expected to triple production in three years. This article gives details of the scheme, and describes the methods used in the vegetative propagation of clones.

By D. R. A. EDEN

General Manager, New Zealand Reparation Estates, Western Samoa

A WELL-DEVELOPED scheme for the stimulation of the cocoa planting industry in the British West Indies has been established by using the free distribution of high-yielding vegetatively-propagated clones as the principal incentive to cocoa planters.

The Department of Agriculture has set up propagating stations in the cocoa-growing districts of Trinidad and Tobago, and throughout Grenada. These stations have established large nurseries of selected clones from which are drawn the greenwood cuttings for propagation and eventual distribution to the planters.

One of the main Government propagating stations in the British West Indies is at La Pastora, some eight miles north of Port of Spain in Trinidad. It is possibly the largest cocoa propagating centre of its kind in the world. It produces, for distribution to the cocoa planters, some 300,000 rooted cuttings annually, and its propagating boxes, hardening facilities and shaded storage sheds cover literally acres of land.

The Trinidad Government, following successful experiments made by the Imperial College of Tropical Agriculture in the mass production of selected clones, established La Pastora and other smaller centres throughout its territory. All these centres are situated within the principal cocoa growing districts.

The hardened rooted cuttings produced by the propagating centres are distributed to planters without charge, and a gratuity is paid by the Government to each planter for every adult tree grown from a propagated cutting as soon as it reaches bearing age. Fertilizers, too, are supplied free from the time the rooted clone is planted, until it matures. This largesse has had the effect of stimulating the cocoa industry of the B.W.I., and is expected to triple production there in the next three years.

Some of the clones grown in the Government nurseries were originally selections made by the Research Staff of the Imperial College. In Trinidad and Tobago, I.C.S. (1) and I.C.S. (95) appear to be the most popular. The first clone, I.C.S. (1) was established some seventeen years ago, and areas planted exclusively under one or the other have yielded as much as 2,000 lbs. of cocoa (dry weight) per acre per annum.

At the Imperial College of Tropical Agriculture at St. Augustine, Trinidad, may be seen in use a new type of centrifugal humidifier for the rapid propagation of cocoa cuttings. A frosted glass house 18' x 10' x 8' high contains an electrically driven machine which produces a thin fog of water vapour. This fog maintains a maximum humidity, and at the same time regulates and controls and heat generated inside the glass house by the tropical sun. The heat and maximum humidity combine to accelerate the mass production of rooted cuttings.

The hormone-treated cuttings,* in baskets made of woven split bamboo,

* Turialba reports through its publication CACAO, September to October, 1953, that their best results have been obtained with indolebutyric acid at 7000-8000 ppm in alcohol 60% applied by the quick dip method.

Interior view of slat-roofed bush house at Tuanaimato, with constant type of propagator in use.

La Pastora propagating centre, Trinidad. Vegetatively-propagated clones in storage await distribution to planters.

are housed in the glass house on shelves or racks. Propagation takes from 16 to 20 days. A further 7 days are allowed for the roots to penetrate through the sides of the basket containers; they are then transferred to slat-covered bush houses for a final two months' hardening and storage, awaiting distribution and planting under shade in the field.

The fog-making machine is manufactured by the Bahnson Company of 1001 So. Marshall Street, Winston-Salem, N.C., U.S.A. It is described as a Type H, Centrifugal Humidifier. Its f.o.b. value is around 175 dollars American. It is powered by a ¼ h.p. electric motor of 110 volts.

In preparing the contents of the baskets for the humidifier a soil and compost mixture is first placed in the baskets (diameter 7", depth 10") surrounding a central hollow aluminium cone. This hollow cone is 2" in diameter and 10" in length. It is filled with well-matured sawdust or sand as a propagating medium. When the metal cone is withdrawn, it leaves in the basket a central core of sand or sawdust, surrounded by soil and compost mixture.

The leaf or cutting, after being dipped in a standard strength of rooting hormone chemical, is inserted in the central sawdust core. Propagation commences in the core, and the roots as they develop spread out to feed in the outer layer of compost and soil. The whole process is complete when the rootlets begin to show through the wicker structure of the basket container.

La Pastora and the other propagating centres throughout the B.W.I. do not use the humidifying machine for their propagating. The glass-lidded box type of propagators are used exclusively, with a water drip on the outside of the muslin-covered glass; the propagating medium is hand-watered to maintain humidity inside the propagators. Whilst the machine humidifier is recognized as a definite improvement on old methods, a routine production has been evolved and maintained by use of the older glass-lidded box type of propagators, and the labourers employed have become expert in the techniques of producing rooted cocoa cuttings through the use of that equipment. For these reasons, and because of the excessive costs involved in making changes, the various stations do not contemplate installing humidifying machines. These reasons would not, of course, apply to any new station which may be set up in the future.

The following brief notes are taken from the author's diary. The entries were made during a visit to the La Pastora propagating centre:—

Maturing of Sawdust for Potting: The rotting of this is accelerated by the addition of sulphate of ammonia, in layers, as the heap of fresh sawdust is built.

Potting Soil: La Pastora uses well-matured or rotted sawdust, stable manure and virgin topsoil, all in equal parts.

Propagators: The older propagators are constructed of cement, of the closed box type with sloping tops constructed of glass, with gauze or butter muslin covers kept moistened by constantly dripping pipe jets (used for the control of temperature). The contents inside are watered by fine spray nozzle hoses from 3 to 5 times daily, according to weather conditions. Each application with the hose takes one minute for each box.

Period of Propagation: The average duration in the propagators is 26 days, with a further 15 days in the hardening boxes. For hardening, the rooted cuttings are potted in baskets, and then replaced in the propagators; the lids of the boxes are then propped open with 4" timber props. For hardening, only the insides are watered, and the constant drip on to the butter muslin covers is closed off.

Storage: When the potted rooted cuttings are removed from the hardening boxes they are laid out under a housing with a roof constructed of alternate 14" strips of glass and aluminium corrugated sheeting. Alternatively bush houses are used. The roofs of the bush houses are made either of bamboo strips or sawn timber slats 1½" x 1½" are used with 1" spacing between. The cuttings remain in the glass or bush houses for a further 6 weeks before being passed for distribution. In the bush houses, the cuttings are watered sufficiently often to keep the soil moist.

Fertilizing: When the clones are transferred from the hardening boxes to the bush houses, they are fertilized in the baskets with 5 grammes of artificial manure; sulphate of ammonia, superphosphate and sulphate of potash in a 3-2-1 mixture by weight. This primary application is repeated every two weeks.

Cuttings: These are taken whenever

possible with five leaves. The best results are obtained with cuttings taken from nursery trees from one to six years of age.

Nurseries: Considerable emphasis is placed by the experts upon the desirability of establishing nurseries sufficiently large to give an adequate supply of propagating material. La Pastora fertilizes its nurseries five times annually, each tree receiving ¼ lb. of the 3-2-1 mixture at each application. This ensures the vigorous development of wood suitable for propagating purposes.

Planting in the field: The position in which a rooted cutting is to be planted should be fertilized with pen manure, or compost should be added to the soil.

The planting of cocoa in territories which are suitable for growing that crop has been recommended as a sound agricultural policy. Present-day prices indicate a world shortage, and it may be many years before world production can equalize with the steadily increasing demand for chocolate.

At the 1953 London Cocoa Conference, delegates were informed that 200,000 tons of cocoabeans are lost annually by the ravages of pests and diseases. Capsids, swollen shoot, witch's broom and black pod are taking a heavy toll.

In the Gold Coast during 1953, the cocoa cut down because of swollen shoot disease averaged 574,000 trees a month.

Notwithstanding the high prices and great efforts on the part of many Governments operating to increase production, the world supply of cocoabeans has failed to meet the demand, and manufacturers fear that the margin is still widening.

In the British West Indies, the policy of increasing production through the free distribution of high-yielding clones, and the encouragement given to planters by the payment of a bonus for each tree brought into bearing, appears to have been successful in stimulating the industry there.

The mechanics of this policy are not beyond the scope of any of the Departments of Agriculture in cocoa-growing territories within the region of the South Pacific Commission. Selection of high-yielding and disease-resistant clones should first be undertaken, and then the establishment of extensive nurseries for their extended propagation. This may prove to be a long-term project, but no better way to stimulate the industry and increase production than by the free distribution of high-yielding clones has so far been discovered.

UNESCO Study Kit

By K. NEIJS[1]

Unesco, Education Clearing House: *Study Kit on Teaching Reading and Writing.* Paris, 18 November, 1953. Two boxes.

PART of the idea of a "study kit" is to provide the isolated field worker with a ready and handy set of materials, sufficiently varied in contents for at least part of it to apply to his particular problems; not unwieldy in any respect; not over-large; not too deep a well of information, but rather a clear-cut form of stimulating documentation.

The Study Kit on Reading and Writing now issued by Unesco answers in many respects to these requirements; and it must be a far from easy matter to compile a collection of materials which could satisfy Unesco's world-wide clientele. The contents of this kit originated in a world-wide survey of the teaching of reading and writing recently made under Unesco auspices by Dr. William S. Gray, Professor of Education, University of Chicago. The preliminary survey itself has been published by Unesco,[2] and the kit has been circulated for detailed study of materials in conjunction with it.

Primers and Readers are essentially instruments of culture, and cultural environments of course differ widely. In the kit there is a division between books on methodology, textbooks for adults and textbooks for children. The methodological material is neither too scientific nor too comprehensive for practical purposes. There is an excellent Australian Council for Education Research publication on *The Approach to Reading,* there is Vernon's almost classic pamphlet on *Reading Ability,* there is a very useful little handbook on the organization of literacy campaigns (Nigeria), etc. It would be interesting to see more material on approaches and results in some Asian countries. But the strong emphasis of the kit on methods and mechanics of teaching reading, rather than on the content of reading material, is a good thing in itself.

Concerning the textbooks, a comprehensive and helpful "Guide" has been attached to the kit, containing directions prepared by Dr. Gray for analysing adult reading and writing materials, as well as detailed, locally-prepared analyses of most of the textbooks themselves. This is particularly illuminating; without it, it would be rather hard to comprehend the underlying principles of the construction of many of the primers as such, several methods being followed in a variety of ways.

The collection might have been somewhat larger, while in addition to the "Guide" it would have been a good idea to insert translation sheets of the several vernacular texts. However, some very useful books are included: South Africa's excellent Zulu adult literacy primer *Uvukufunde,* a few original and inexpensively-produced Mexican Lapatico readers, as well as the English *Beacon Readers* with their outstanding Teachers' Manual, while it is gratifying to see some attractive French ventures included. The endeavour is certainly valuable, and succeeds in giving a cross-section of the very considerable activity in the field of primers and readers for teaching reading and writing.

Dr. Gray is returning to Unesco in 1954 to revise and complete his work on the teaching of reading and writing. To assist him in this work, Unesco's Education Clearing House is seeking comments on Dr. Gray's Preliminary Survey, and further sets of textbooks, if possible with local analyses, along the lines of those included in the Study Kit.

The Commission's Executive Officer for Social Development is co-ordinating the technical side of this work for the South Pacific island territories, and will be glad to supply a copy of the Preliminary Survey, or to lend the Study Kit, to interested persons in the islands.

1 Dr. Neijs is Literary Adviser to the South Pacific Commission.

2 Gray, William S.: **Preliminary Survey on Methods of Teaching Reading and Writing.** Paris, Unesco, Education Clearing House, July, 1953. Vol. 1: Survey of Theories and Practices; 66 p., illus., tabs. Vol. 2: Summary of Suggested Practices; 73 p. (Educational Studies and Documents V.)

Plant Introduction

(*Continued from Page 27*)

areas are especially rich in crop varieties. It will be noted that the areas in which richness in crop plants coincides with climatic similarity to the Pacific islands occur in two main regions, i.e., the Malayan region and Central America—the latter with an outlier in eastern Peru. The Malayan region is of interest because of its richness in such plants as rice, tropical fruits and sugar cane, as well as the bamboos to which reference has been made previously. The central American region is a valuable source of the New World crops such as maize and cotton. Also, as pointed out elsewhere, it is particularly rich in potentially useful tropical pasture and forage plants. The fact that it has a flora with little affinity to that of the South Pacific region gives it added interest as a plant exploration zone.

While, therefore, extra-regional plant exploration may be expected to yield rich rewards, there are also great potentialities for useful plant exchange within the South Pacific region itself. The isolation of many of the islands, as well as the great variations of topography in the larger islands, has led to the development of innumerable distinct local strains, especially in the indigenous food plants. No thorough attempt has been made to bring these local strains together for comparative study. It is, however, especially in combination with plant breeding that such comparative studies would be of value. Recent work in America and elsewhere has shown how great are the possibilities of the development of useful plants by intercrossing

between strains which have arisen in different ecological niches. Such crosses produce a gamut of widely differing forms—basic material for that "explosive evolution" which may be as important in the development of crop plants as it is in wild species.

The potentialities of such "ecological crossing" have nowhere been fully explored. The South Pacific region, with its unique combination of geographical, ecological and cultural isolation factors, offers a potential testing ground unparalleled in the world.

COMMISSION'S EXPERT REPORT SERIES

UNDER the auspices of the South Pacific Commission, the Oxford University Press is publishing a series of expert reports in book form. Four have been issued to date. They are:

VOCATIONAL TRAINING IN THE SOUTH PACIFIC. By R. A. Derrick, M.B.E., A.M.I.S.E., F.R.G.S. Mr. Derrick's report consists of a survey of the facilities for professional and technical training in the whole of the South Pacific, and of recommendations for future development. It constitutes a most valuable survey of the whole field of education in the area.

Price in Australia *30/-*

MOTURIKI: A PILOT PROJECT IN COMMUNITY DEVELOPMENT. By Howard Hayden. A fully documented, copiously illustrated report on a pilot project in community development carried out under Commission sponsorship on the island of Moturiki by the Government of Fiji. The author, Mr. Howard Hayden, who is now Director of Education for Trinidad in the British West Indies, held a similar post in Fiji at the time of the project, when he acted as Chairman of the Advisory Group appointed by the Government of Fiji to direct it. (A review of Mr. Hayden's report appears on page 18 of this issue.—EDITOR.)

Price in Australia *42/-*

SOCIAL ANTHROPOLOGY IN MELANESIA: A Review of Research by Dr. A. P. Elkin, Professor of Anthropology in the University of Sydney. In this report Dr. Elkin has reviewed past anthropological research work in Melanesia, and has surveyed our present knowledge of this region. He has also outlined the principles of a plan for future anthropological research designed to advance native welfare and development.

Price in Australia *27/6*

SOCIAL ANTHROPOLOGY IN POLYNESIA: A Review of Research by Dr. Felix M. Keesing, Professor of Anthropology, Stanford University. This is a parallel study to Professor Elkin's report on anthropological research in Melanesia.

Price in Australia *27/6*

The above volumes are obtainable from leading booksellers in the main English-speaking countries throughout the world. French editions are also being produced. Further details are obtainable on request from the Secretary-General, South Pacific Commission, Nouméa, New Caledonia.

Copra Kiln : A Correction

ON page 29 of the January *Quarterly Bulletin* an article appears giving details of the Standard Ceylon Copra Kiln. The plan and elevation diagrams included were, in the original, 13½ inches across overall. It is regretted that, when they were reduced to fit into page width of the *Bulletin*, the scale, given in the original as 5 feet to an inch, was not reduced correspondingly. However, the figures given for the main dimensions of the kiln of course remain correct.

PICTURE CREDITS

Acknowledgment is made for photographs reproduced in this issue, as follows: Pages 14, 25, Australian Official Photos; pages 15, 17, 18, 19, 20, 24, Fiji Official Photos; page 23, photo by Eve Gray.

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Reports of Meetings of the Research Council (First to Fifth).

Reports of First and Second South Pacific Conferences.

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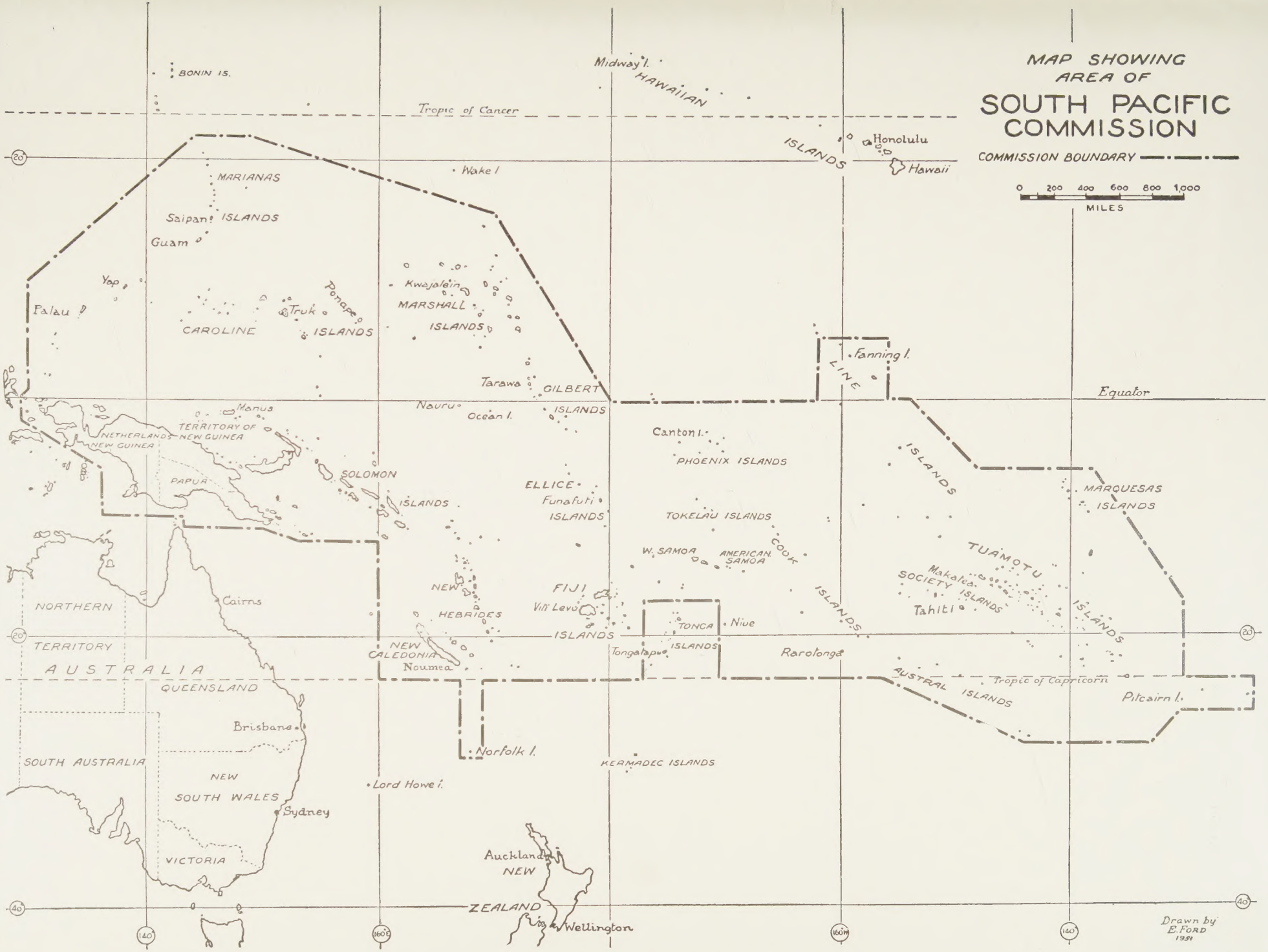
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Saipan
ISLANDS
Guam
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